The Chemical Age

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Notes and Comments

One Professor to Another

PROFESSOR G. T. MORGAN, immediate past president of the Society of Chemical Industry and a member of the Council of the Chemical Society, speaking at a meeting of the Chemical Society at Birmingham on November 26, referred to Professor H. E. Armstrong's series of articles in THE CHEMICAL AGE on "The Institutes of Chemistry," in the course of which, according to his interpretation, the doyen of the chemical profession had suggested that the chemical society was moribund. As a member of the Council, Professor Morgan said he was willing, for the sake of argument, to accept the impeachment so far as the Council was concerned, but he did not think it was quite fair to apply it to the Society as a whole. After reciting the number of members, authors of papers, etc., Professor Morgan claimed that during the past 90 years the Chemical Society had done wonderful research work, and he hoped Professor Armstrong's indictment would not be taken too seriously. The Birmingham meeting was the first scientific meeting held by the Society in the provinces, and Professor Morgan regarded its success as evidence that the Society was entering upon a new lease of life. Nine years hence the Society will celebrate its centenary, and from all parts of the world representatives of learned societies will attend to offer their congratulations.

We were glad that Professor Armstrong's criticisms provided Professor Morgan with so favourable an opportunity of giving a little publicity to the Chemical Society, but those who have read Professor Morgan's reply must not lose sight of the real meaning behind Professor Armstrong's articles. His whole aim has been to reveal the weakness of the present organisations and to point the way to an effective unification of forces to save the situation. Most of the scientific societies have been subjected to searching criticism, and the candour of so eminent an authority cannot fail to provoke useful thought on the part of those in whose hands lies the future of chemical science and enterprise. Whether thought will be transformed into action time alone will tell.

Safety in Handling Chemicals

ELSEWHERE in this issue we give extracts from a paper which Mr. Warren N. Watson, secretary of the American Manufacturing Chemists' Association, presented at the twenty-first annual congress of the American National Safety First Council at Washington, on the safe handling of chemicals. We are not unmindful of the safety precautions which have been adopted in this country—so far as they are common knowledge—but we welcome the opportunity afforded by the receipt of Mr. Watson's paper from the secretary of the American safety organisation to stress once again the importance of safety first in industry, and particularly in the chemical industry. The Manufacturing Chemists' Association in the United States is in its sixty-first year, and one of its principal activities has been a continuous research programme on chemical containers and the handling of chemical products. Progress in the field of chemical containers has kept pace with the remarkable developments in the chemical industry itself. This programme necessarily has a direct relation to safety, and it has been the consistent policy of the Association to place safety first in the development of new containers.

Mr. Watson, in his paper, summarises the work already accomplished by his Association. A survey of chemical handling revealed the necessity for precautionary instructions for the consumer of chemicals in a properly co-ordinated and uniform style, and a Manuals Committee has directed its efforts to that end. Its purpose is to disseminate information to the public and interested parties on procedure and precautions to be observed in the handling of chemicals and their containers. The manuals are written for the consumer, the producer and the shipper, with special emphasis on safety. In its safety work, the Association has always endeavoured to make a careful scrutiny of the viewpoint and the reactions of the persons to whom precautionary warnings and information are directed. In this connection, one factor must always be borne in mind in safety work—and that is the human factor—for efforts which do not recognise the necessity for a clear direct contact with the individuals for whom the information is intended will not only miss the bull's eye but the target itself.

Science in Soviet Russia

THE position of science in Soviet Russia is somewhat obscure, though not nearly so obscure as it was a year or two ago, and it is easy to get a wrong impression. On the one hand, we have the opinions of the wilfully blind, and on the other, we have the cheery, but unsupported, optimism of the officially inspired press reports. We can be quite sure, however, that the scientists now at work in Russia are in silent agreement with the aims of the Soviet and are prepared to regard their science as merely a means to the successful accomplishment of the Five Years Plan. They are forbidden to express independent scientific views and because of these conditions many distinguished scientists have had to resign their posts. Between 1920 and 1930 many hundreds of scientific workers were exiled from

Russia, and their work has now been continued in centres such as Belgrade, Prague and Paris.

Granted absolute conformity to the ideals of the State, however, a scientist in Russia does not appear to do too badly. His work has been recognised as essential and the scope for his activities in such a large country is enormous. Russia has always had scientists though very few of the first class; Mendeljeef was one. The laboratories of Moscow and Leningrad are busy, under a discipline that would be irksome, even if tolerated, at our own Universities where a three months "vac" is not unknown. The reports which appear from time to time in the form of abstracts show that material is not lacking for research work, and though the main idea is the furtherance of the Five Year Plan, this is not always obvious.

Development in Oil Chemistry

CHEMISTRY and the allied subject of electro-chemistry are receiving most attention. Even before the revolution Russian organic chemists were interested in pyrogenic reactions and this interest is still maintained. Oil fuels are receiving special attention and heavy tar oils, of which Russia has an unlimited supply, are being hydrogenated under pressure in presence of catalysts, by Ipatiev at Leningrad. The products are rich in low boiling-point fractions and very free from unsaturated compounds and the consequent objectionable odour. This development in oil chemistry is not without significance in view of the enormous air force contemplated by the Soviet. Catalysis, as might be expected, is also playing a large part in Russian chemistry. The fixation of atmospheric nitrogen is one of the problems that is being tackled, though with what success it is difficult to say. The drop in imports of the nitrogenous type of compound during 1931 may, or may not, be of significance. It is, of course, obvious that Russia will need artificial manures in large quantities and if the Soviet Union is to be self-contained she must make them herself. In bio-chemistry such things as the preservation of caviare and the preparation of tobacco leaf are typical examples of how science is being usefully applied.

Scientists in Russia are not all engaged on strictly utilitarian subjects. Purely academic work is done at Leningrad and Moscow side by side with work that obviously has its uses in industry or agriculture. We find on one occasion an account of the isomerism of the cyclic amines; remarks on the Quantum theory; effect of ultra-violet light on yeasts; and the absorption of potassium chloride by beetroot and effects on sugar percentage.

A Great Indian Chemist

SIR P. C. RAY, founder, foundation president and patron of the Indian Chemical Society, in honour of whose 70th birthday the Society is publishing a Jubilee Number, has written an autobiography which contains much thoughtful advice to the younger generation, based on his own keen observation and ripe experience. He took his D.Sc. in inorganic chemistry at Edinburgh in 1888 and was elected vice-president of the Edinburgh University Chemical Society. It was his discovery of mercurous nitrite which brought him fame and which opened, as he says, a new chapter in his life. His investigations on mercurous nitrite and its derivatives formed the subject of more than 100 communications to chemical journals. Such research was rendered possible on an extensive scale by the new and extensive chemical laboratory constructed about that time by the Government at the Presidency College, under the supervision of Dr. Ray. Slowly but surely an Indian School of Chemistry began to grow round Dr. Ray, with the active assistance of his students, whom he delights to call his chemical children and grand-children.

After retiring from Government service, Dr. Ray joined the newly started University College of Science, Calcutta in 1916, and has since toiled worthily for the advancement of chemical science. Dr. Ray has not been a pure scientist confining his research to the advancement of the science, but has been a pioneer of chemical industry as well. The Bengal Chemical and Pharmaceutical Works are almost entirely his creation. These works at present employ nearly 2,000 hands and the net assets reach £375,000. The sulphuric acid plant with Glover's and Gay-Lussac's tower installed at these works is said to be the biggest of its kind in India.

Hindu Chemistry

ALMOST from the start of his career as chemist, Dr. Ray's mind has been led in this direction. One wonders if it was because while in Europe on study, while he was able to see many chemical works, he was invariably refused admission into the pharmaceutical works, lest any trade secret should leak out. By experimenting with indigenous drugs he was able to prepare pharmaceutical preparations of great value and authentic properties which soon came to be used by the medical profession and displaced the imported preparations. Difficulties cropped up from time to time, but they were patiently handled and solved. "The very idea of manufacturing locally pharmaceutical preparations, which hitherto had been imported, acted like a tonic." Besides these works, Dr. Ray is also actively connected with the Calcutta pottery works and the Bengal enamel works which have been able to attain moderate success.

Dr. Ray is also the author of a history of Hindu chemistry which involved much research in the Sanscrit literature of the past. He was encouraged in this project by M. Berthelot in a special correspondence in which Dr. Ray received a due meed of praise for his erstwhile research activities. This work in two volumes was reviewed with great appreciation in almost all the principal scientific journals of the world and established Dr. Ray's reputation as a great Savant. "It is gratifying to note that all along and even after the lapse of 30 years the work receives appreciative notices in the European scientific journals." Such, in short has been the brilliant career of Dr. Ray as a chemist. His career as a social worker among his people has been no less brilliant. None in India except Mahatma Gandhi knows the common people better than Dr. Ray. He has lived an admirably simple life and mixed freely with the village folk, has talked with them in their own dialect and has toiled for them in times of distress. He has been the most active friend of the untouchables, and their uplift has almost been a second religion with him. Of the students in schools and colleges, he has all along been the idol.

The Institutes of Chemistry—IV

By Professor H. E. ARMSTRONG

"THE bad effects of religious education depend partly upon the particular doctrines taught and partly upon the mere insistence that various doubtful propositions are known to be true. Whether these propositions are in fact true or not may be undiscoverable but, in attempting to make the young regard them as certain, religious teachers are teaching what is false, since, whether true in fact or not, the propositions in question are emphatically not certain . . . it is impossible to instil the scientific spirit into the young so long as any propositions are regarded as sacrosanct and not open to question. It is of the essence of the scientific attitude, that it demands evidence for whatever is to be believed, and that it follows the evidence regardless of the direction in which it leads . . . Lying to children, although moralists do not think so, is an unleniable practice and an ethic which demands it can hardly be sound."—"Education and the Social Order": Bertrand Russell.

PRETTY straight hitting this but true in every word. Substitute sciential education for religious and we have a clear picture of the faults in our teaching, not of chemistry alone, especially on the physical side, but of all the sciences. I use the term "sciential" advisedly, for the loose education of the Huck Finn-Tom Sawyer type we are now pleased to give as "science." We "let on" eternally in our teaching. Reasoned training, worthy to be called scientific, is practically unknown.

"Isms" fill the bill. Since about the middle 1880's, when the Arrhenic superstition was advertised into prominence and the cult of make-believe established, the fraternity of science has been possessed by the devil of *Ionomania,* raised at a later period to the more spiritual dignity of *Electronomania;* this latter now has the world in its grip, whether for good or for evil the fates must decide. Coincidently, women, have changed their manners and their dress: light as it is, under it they are women still. Suffice it, the electron is now our fashionable shibboleth: considerable money has been made by endowing it hypothetically with a special kind of jumps, said to account for everything. Those born to a faith are necessarily faithful; only the old can be faithless and critical, holding a key to the events of the times through which they have lived which the young cannot turn. It is generally admitted that it is impossible for us to-day to put ourselves into Priestley's place and understand the mastery exercised by the phlogistic hypothesis, let alone its mystery. Longfellow's lines on the sea are ever true:

Only those who brave its dangers
Understand its mystery.

A Lack of Perspective

I have been greatly struck of late, in reading "Great Victorians," a series of biographical sketches written by younger men, by their general failure to feel the pulse of the times they seek to describe. Historical opinion must be "fiction mostly." As we make no attempt to teach the historical development of our science, the younger generation necessarily has no sense of perspective and may entirely overlook fundamental issues. Among the younger men, how many are well and truly read today?

Only the chemist is able to put meaning into the winter of our present discontent. He alone holds the keys of structure and can see how entirely even human behaviour must be conditioned by chemical structure. Psychology can have but little value so long as it is unable to take into account the infinite complexity of the human mechanism. We have only to think of the complexity in structure of a gramophone record to realise our incompetence to discuss the problems of behaviour. The clerical mind—the typical Oxford mind—must be a record entirely different in pattern from that of a scientific mind; as different as a paraffin is from a phene or chalk from cheese. The clerical mind, however, is the natural mind; only the few here and there have or can have a scientific outlook. Observation over a long period has convinced me of this. Most are not educable. Man necessarily, throughout time, must have been structurally so built as to be gullible; the habit is one that few can avoid. If he had been individual and not gregarious, he could never have survived. History is full of proof that the intelligent have always sought to keep each other under—they do so to-day, though the method is more insidious.

In teaching, therefore, in order to train on the worthy, we not only have to know our subject but to know and overcome ourselves. The hard task is upon us to be faithless in our pursuit of truth; at most, for the moment, we may put an explanatory gloss upon the facts but only if we make it clear that it be a gloss.

Pottering must be made impossible; this is our plainest duty; all inquiry should be fully informed and purposed. The call will be a sufficiently difficult one to meet; it will involve an unusual honesty of purpose, now that so-called research is made a sheltered occupation. In any case, we shall have to take an *Erewhonian* view of publication and treat the desire for it as a disease—if only to reduce our literature to reasonable proportions.

We have to get back to a simpler chemistry—to put scientific meaning into our subject. During nearly fifty years, whilst giving ourselves over to *Beilsteining* and redundant physical measurements, we have neglected all serious study of the nature of chemical change. More is involved in this than writing-in dots and dashes after symbols; casting hydrogen atoms into chains and dubbing them "leaning protons"; or completing visionary octets. Poor old Kolbe, my venerated teacher, is indeed justified. In dressing down van't Hoff, he rightly foresaw the danger of the oncoming metaphysical haze in which the modern generation has enwrapped itself. Until we can put some honest, conceivable interpretation upon the results, all further playing with physical measurements, unless it be in clear relation with industrial practice, may well be stayed. The work has little educational value; it destroys imagination in the student and sterilises the teacher. All the physical roads lead to one Rome. Whatever characteristic we study, we arrive at practically the same classification. We may as well return to plain mutton and seek to cultivate the infinitely productive chemical garden at our door. We have to give up pottering with stock chemicals and go back to the land, where the honest digger may count on being well paid. Aside, I may say, all good preparative work has some value—but it is not to be regarded as original inquiry anymore than is shaping a piece of wood in the lathe.

Our "Dotty" Generation

Apart from the work of a few men mostly engaged in studying natural materials, the chemical journals generally contain little of real moment. To my thinking one of the most significant recent communications is a short description of experiments on the reduction of copper oxide by hydrogen, in which it is shown that, provided the surface layer of moisture naturally present be removed, there is no "period of induction." Such observations may be taken as disposing of the periods of induction and activation constantly observed—simply because proper precautions are not taken to start from scratch.

Fifty years ago, some of us chased the nimble substituent round the benzene and naphthalene molecules and obtained pretty clear ideas "how Dan'l jumped," whether shotted or not. To-day, the chase is extended *ad nauseam* to other phenes. The hunt has merely a new jargon, which only the elect understand; two dots may take the place of a dash and the ladies shoot with bent arrows. The old huntsman can only wink at such proceeding—as "all my eye and Betty Martin" business. The new generation, in fact, writes its own epitaph in its formulæ; it is gone dotty through unjustified, meaningless assumption; through disregard of truth by its leaders, who are overcome by religious emotion, not by fact.

The substructure of our science is so magnificent that these things would matter little, were it not that the rising generation of workers has false issues put before it and is thereby rendered full of vain conceit and untrustworthy—without any considered training in true scientific method. We can glory in our ability to unmake and remake—yet we have no real understanding of either operation. We are put to

shame at every step we take in the world of living things by their silent efficiency.

Vast as is our knowledge of materials, except to Popes and Robinsons, with great innate powers of mental digestion, it is unassimilable, soulless knowledge without inner meaning. To the majority, the laboratory exercises disguised under the blessed word research are merely a pleasant diversion, the equivalent of bridge and cribbage. This is particularly true of institutional work. At Oxford, three young men unite in the manly exercise of measuring the density, rate of heating and viscosity of nitrobenzene. Subconsciously, one is reminded of " Three blind mice, see how they run." A few years hence these young men may meet at their club and play poker. The one exercise would be about as good as the other as a mental stimulus, the game probably having the greater value, because there is no pretence of truth behind it and no D.S.I.R. grant given in its support. We are assured that there is no discontinuity of behaviour near the melting point. The trio is able, therefore, to question observations recorded in sundry letters to " Nature." Unfortunately " Nature " has developed a habit of encouraging the marketing of unripe fruit. Too many are unaware of the old adage—" Take care of purity, properties will take care of themselves and run straight." The particular research took three *and two colleges*. I assume it is very difficult to pull a thread of nitrobenzene across such an interval. Is it perhaps that the will to work in Oxford is reduced to a third in these days? Our Journal shows that in some places it falls to a fourth: in institutional research, it is even down to a sixth. Soon mayhap we shall call in herd research for every problem. We expect more from a college that, 50 years ago, astonished our world with non-flam carbonic oxide and should be training men for simple service in the schools.

Atom Smashers

Physicists, having given up physics for proton worship, as neochemists are now declared atom-smashers. They are developing a most exciting game on the lines of billiards and small-bird shooting. They wear specially fine feathers in the public eye. Whether they will be able, by their Pankhurstian tactics, to convince us that they too can synthesise, remains to be seen: we are accustomed to handling our products.

Sixty years ago, I compiled a small systematic manual of Carbon Chemistry. If I were now to bring the book up to date, it would be a bigger volume—in principle, little changed. In fact, I went further in my feeble attempts to get behind chemical change and interpret the process than any writer does to-day. Thus, in my innocence, having thought out the subject, I set out the nature of the primary change involved in oxidation processes—the " hydroxylation theory," recently proclaimed proved by Professor Bone, in his brilliant Bakerian lecture at the Royal Society. In the interval, there has been endless futile talk on the subject. Oceans of writing and printers-ink have been spilt over continents of paper—to no useful end, through neglect of first principles and unenlightened experimenting. Man apparently has not the art of learning much from others: as a rule, he can learn only through experience. The great Faraday, at the close of his life, himself said—" I was never able to make a fact my own without seeing it." (Bence Jones' Life of Faraday, 11.440.)

Eternal Talk of Ions

To-day, there is eternal talk of ions but no one knows anything of electrolysis, apart from a picture of the Hofmann tube. No student sees electricity made. He has merely to *plug two holes in the wall and, Hey, presto! out it comes.* Who cares from whence or what or how or why? In 1870, whenever we needed to use the Duboscq electric projection lamp, we had first to set up a 50 cell Grove battery; still worse, afterwards to take it down and wash out all the parts thoroughly, as soon as possible, to prevent loss of the zinc. We saw red, smelt, tasted and inhaled red and our fingers were more than stained. At the same time we learnt to know and respect sulphuric acid as a tangible and corrosive, oily liquid—using it as a sulphonating agent, when shaking it hot with a hydrocarbon, the bottle sometimes broke and bang went more than sixpence in trousers. We had no doubt, after such experience, that acids had a real existence and might be very unpleasant neighbours. The present-day student is taught to look upon the acid as a visionary charge mystically attached to a hypothetically meandering hydrogen atom—a poor lost soul. He conceitedly prates of hydrogen ion concentration, not the least knowing what "acidity" means. Some one should write Huck Finn and Tom Sawyer again in terms of hydrogen ions. The acids no longer have any individuality assigned to them—they are not even mentioned—H is their lying symbol. The unique character of sulphuric acid is entirely disregarded. No one attempts to think in terms of an actual voltaic cell—if any thinking be done it is in terms of a pseudo-mathematical gloss of unproven assumptions. Let us hope that some day soon we may get over these measles. If anyone wishes to see in how false and farcical a way schoolboys are taught, I refer him to an article on the rusting of iron in the current issue of " The School Science Review."

Burn the Text Books

In the latest German text-book on inorganic chemistry, I find an elaborate opening account of the periodic generalisation, dressed out in ultra-modern electronic frills—but not a word as to the general theory of what used to be common objects of the laboratory bench, the acids. Under nitric acid, we have the conventional 3Cu, etc., with the statement, that the metal is first converted into the oxide, which is then dissolved to nitrate: with Osric I can only say, " A lie, a very palpable lie!" It were time that we took all the text books and burnt them in a heap, so as to destroy their accumulated errors and enforce some real study of the literature. Not a book gives a truthful account of the interaction of sulphuric acid and common salt.

Being overcome with nitrous fume, in 1875-1876, together with my deceased friend Acworth, afterwards of photographic dry-plate fame, I undertook a comprehensive study of the gaseous products of the interaction of metals and nitric acid. The subject was further discussed by me, in later years, always from an electrolytic standpoint. Not the least reference is made to the work in the text books and every now and then someone potters afresh with the subject—without understanding and to no useful end. Only in May last, our Society published a long account of experiments in which currents of different strength were passed, between platinum electrodes, through solution of nitric acid, the variation in potential between the electrodes being measured the while. The results are such as might be expected and leave us cold; as we were. Such work is merely an exercise in manipulation—it is not research.

Chemists must Get Together

My view of the situation was expressed six years ago, in the final paragraph of the introduction to my " Art and Principles of Chemistry,"—a book which no one cares to buy at the impossible price at which it is published; moreover, it is not a cram book and dangerously charged with unorthodox opinion:

" Chemical theory to-day is in a most destitute condition, a disgrace to our cloth, in no way congruent with our vast knowledge of fact; for too many chemists are working in alleys and backwaters, without proper guidance or the possibility of appealing to reason. This state is one to be remedied without delay, so that the fascination and grandeur of our science may be apparent, its infinite and fundamental value fully realised."

Chemists *must* get together, without further delay, if only to consider means of overcoming the conditions of undeveloped intelligence which prevail in their ranks, preventing the effective use of our science in the public service.

Information on Modern Lacquer

MODERN lacquer is the subject of a new brochure which has been issued by Rex Campbell and Co., Ltd. This brochure includes the reprint of a paper read before the Birmingham Paint, Varnish and Lacquer Club, and the report of a series of tests on different plasticisers to determine their influence on various constituents in the manufacture of cellulose nitrate lacquers and finishes. The field covered in regard to the tests is fairly wide, including wetting and grinding properties, storage of the pigment-paste compositions, colour variation of the pigments during grinding, viscosity and storage of the manufactured cellulose enamels, durability and weathering properties of the film.

Properties of Coal in Fine Division

Suggestions for the Ideal Colloidal Fuel

THE Kaiser Wilhelm Institut für Kohlenforschung, at Mulheim-Rheinau, Germany, under the direction of Dr. Franz Fischer, has been responsible for greatly enlarging the general knowledge of coal and its products, as well as being the home of numerous discoveries in the field of fuel research which promise to be of great importance in fuel economy. One of the latest investigations of the Institute, yielding some striking results, is that concerned with the behaviour of coals in a state of fine division, carried much further than that of fine coal in the ordinary sense. Dr. Kurt Peters and his associates have shown recently that coals contain much larger quantities of occluded hydrocarbon and other gases than was formerly supposed, but to release these from the coal it is necessary to mill the coals in a vacuum much finer than in ordinary milling, in fact, to an average particular diameter of 1/1,000 mm. of μ. The actual quantity of gas thus released depends upon the character of the coal, and is greatest in the highly bituminous varieties.

Extraction of Fine Coal by Solvents

In "Brennstoff-Chemie," October 1, Drs. Fischer, Peters and Cremer report the results of further investigations of the properties of this very fine coal in regard to its behaviour with solvents, in low temperatures and high temperature retorts, and the products yielded. The behaviour of this μ coal is essentially different from that of the same coals in a fine, but still relatively coarse, condition. The knowledge gained from this experimental work on very fine coal is believed to be of very considerable value in a technical sense. In the first place, it is shown that a good proportion of the bitumen in the coal can be extracted by solvents, such as benzol, trichlorethylene, and others with low boiling points, and thus become available for different purposes. In the second place, it is shown that in retorting this fine coal at low temperature, a superior semi-coke is obtained and a much increased yield of tar products, while, when retorted at high temperature to produce coke, the coke is hard and dense and generally of high quality. The thermal decomposition products of coal have long provided large quantities of material for the chemical industry, but fine division of the coal in the sense here discussed, permits a direct use of the coal as a chemical raw material, due to its great reactivity with numerous chemical reagents, and seems likely to result in the production of chemicals not readily obtained through the thermal decomposition of coal. At this early stage of the investigations it is difficult to judge the full possibilities offered by the use of this μ coal, but one possibility seems to rest on the fact that when this fine coal is mixed with oils and alcohols it forms suspensions which remain stable for an indefinite time, not being amenable to separation by centrifuging at high speed and only separable with difficulty by filtration.

Method of Milling

No data are yet available to show the cost of reducing coal to this degree of fineness; obviously this must be very considerably greater than in the case of preparing coal for use as pulverised fuel, but in view of the improvement in the properties obtained thereby, this extra cost is probably justified. The coal is milled in steel ball mills, under a vacuum of between of between 1 and 3 mm. of mercury. In the experimental mill, tests were made to show the effect of the degree of division on the extraction results by solvents: here it was found that, while the extractions improved by longer grinding, it was not until the coal particles reached an average size of 1/1,000 mm. that the yield made a sudden leap. In the following table, the results obtained by different grinding periods up to 16 hours, and 20 hours extraction, are recorded, the solvent used being trichlorethylene:—

Milling Hours.	Extraction Yields in % of Weight of Coal.		
	First 6 hours.	Additional 14 hrs.	Total of 20 hrs.
1	1.8	0.02	1.8
4	3.3	1.20	4.5
4	3.4	1.20	4.6
4	3.5	1.20	4.7
8	5.4	1.00	6.4
16	6.6	2.00	9.5

It will be noticed that three different samples of coal, milled for four hours, yielded practically identical extraction results. Also that the maximum extraction of 9.5 per cent. was obtained only after 16 hours milling. A further prolongation of the milling, however, did not increase the extraction values. Microscopic examination of these coals showed that only after 16 hours milling were the greater part of the coal particles reduced to a size of 1/1,000mm. Even after milling for half an hour the particles were reduced so as to pass without residue through a screen of 10,000 mesh per sq. cm., which means that all the particles were then smaller than 60 μ. The increase in extraction from 1.8 to 9.5 per cent. is due to the increased fineness of the coal.

The value of the vacuum in milling was proved by tests which showed that the same fineness was obtained in eight hours under slight vacuum as was obtained in 16 hours milling with a pressure of 1 to 3 mm. of mercury. It is supposed that air under pressure in the mill exercises a cushioning effect on the dropping of the steel balls, which reduces their crushing efficiency. Milling coal particles of 5 mm. diameter to 0.05 mm. diameter, or 1,000 times smaller, is almost without influence on the extraction yield; it has been sizes of that order which have been used chiefly in previous investigations.

Removal of Bitumen

The solution of the bitumen of the coal is slow by all the solvents used. The solvent has to penetrate into the interior of the coal particles to dissolve the enclosed bitumen. The solvent action is more or less proportional to the surface area exposed in a gram of coal, as shown in the following table:—

Size of Particles (mm.)	Surface Area per gram (sq. cm.)	Theoretical Extraction (per cent.)
1.2	36	0.025
0.6	71	0.050
0.3	143	0.100
0.15	286	0.200
0.075	572	0.400
0.052	823	0.600
0.036	1200	0.800
μ coal	42800	10.000

The sudden increase in the dissolved bitumen appears to be in structural, or perhaps colloidal, properties of the coal substance. Although the cell structure of coal is not proved by microscopic investigation, it is possible that plant cells make up the principal part of coals, so far as they have resisted the extensive changes of the in-coaling process, and that they still enclose within themselves the bitumen. By milling the coal to a fineness of say 20μ, the cells are not essentially broken, and only by further milling is the soluble bitumen set free. But without accepting this cell theory, it is possible to give an explanation of the greater solubility of the bitumen in the fine μ coal. It is known that coal is not easily penetrated by gases, but that great quantities of methane can be occluded in the coal substance which can be set free only by milling the coal particles to μ size. Hence it is reasonable to suppose that the large molecules of most solvents are equally unable to penetrate into the coal particles until they are reduced to great fineness.

Increased Reactivity of Treated Coal

A μ coal prepared by milling bituminous coal from the Ruhr, when retorted at low temperature in a Fischer aluminium apparatus, did not swell at all and yielded a strong semi-coke. The same coal in a size of about 0.5 mm. is strongly swelling but by reducing the size of the coal to 0.001 mm. the swelling property disappears entirely. In one case, the tar output of μ coal was 80 per cent. greater than from the same coal in coarser form. In ordinary coking at high temperature, the product obtained is likewise considerably superior when the coal is first reduced to μ size as compared with the fine coal ordinarily used. The great reactivity shown by μ coal is very important from a chemical point of view. When treated with nitric acid the reaction proceeds violently, although the reaction of the acid on fine coal in the ordinary sense is very small. When ex-

posed to atmospheric oxygen, μ coal is quickly oxidised and increases in weight from the oxygen taken up. The swelling properties of the same coal in coarser form decline very slowly by exposure to the air, whereas with the μ coal this property is rapidly lost. Hitherto, in order to attack coal chemically, a long time of reaction was necessary; otherwise aggressive reagents or high temperature were required if a change in the commercial sense was desired. The knowledge that chemical reagents can react with coal effectively only after the coal has been reduced to μ size is extremely important, not only for the scientific investigation of coal, but also for the chemical industry by creating new possibilities for utilising coal in the industry, and of obtaining relatively high-value products from the same. By the aid of different oxidising agents, Franz Fischer and his co-workers are said to have already obtained suggestive results in operating with μ coal. In coal hydrogenation, which is receiving renewed attention to-day, the results obtained by using μ coal, instead of coal of the usual fineness, are also said to be much more favourable.

Unbreakable Gramophone Records

Achievement in the Use of Plastics

UNBREAKABLE gramophone records was the subject of a paper which H. Courtney Bryson presented to the Plastics Group of the Society of Chemical Industry, at a meeting held on November 30, when Mr. H. V. Potter, chairman of the Group, presided.

The author said he expected to see plastics rivalling metals in ubiquity and importance, and the extended use of synthetic organic and inorganic products, not so much to supplant existing products, but in ways of which we had yet no conception. Gramophone records represented the high-water mark of moulding technique. The four classes of materials used were the natural resins, synthetic resins, cellulose derivatives, and metal. Of the natural resins, shellac occupied a place which transcended in importance that of any others, by virtue of its hardness, plasticity, strength and moulding capacity. Incidentally, it retained its supremacy in the record world and, by reason of its price, and as soon as that rose to more than 1s. per lb., its place would be taken by cellulose compounds. An interesting technical achievement was represented by a record having a surface made from a resorcinol formaldehyde synthetic resin. To his knowledge, there were four companies making records of this material, but no two followed the same plan. In order to produce records from this material a resorcinol formaldehyde resin would be made by reacting on dihydroxybenzene with formaldehyde. The reaction was more vigorous than the corresponding one with phenol, and it was difficult to control. The only two derivatives of cellulose which had yet reached general commercial importance for this purpose were the nitrate and the acetate, but he believed that in the near future there would be some interesting developments with ethyl cellulose. Celluloid records were no longer made, and had been replaced completely by acetate. The manipulation of the celluloid was difficult; excessive hardness caused rapid deterioration of the stampers, the grooves became distorted and the surface covered with small blisters. The process of manufacture for the acetate records was simple, and no elaborate mixing and grinding plant was necessary. Comparatively high rates of production could be achieved.

Surface Noise and Needle Drag

There were obvious advantages in the light, unbreakable and non-inflammable record, but those advantages were offset by quality. Other things being equal, the quality of a given record varied directly as its stiffness, specific gravity and thickness. The softness of acetate, which was so advantageous from the point of view of pressing, was disadvantageous from the point of view of playing. If the groove walls were resilient they would deflect, and distortion of the reproduced sound would result. The needle rested on the bottom of the groove at a pressure of many tons per sq. inch.; the coefficient of friction between acetate and steel was high, so that there was likely to be tearing up of the soft acetate. It had been the practice, in order to overcome this, to decrease the pressure per square inch by increasing the bearing surface, *i.e.*, by using the trailing needle, whereby there was increased area of contact between the record surface and the needle. It was likely, however, to produce harmonics and distortion. More recently a new filler for acetate had been evolved; thus the surface was much harder, the coefficient of friction was lower, and there was no need for trailing needles.

Another type of record was made from a synthetic resin containing protein. In spite of the fact that it contained about 40 per cent. of fibrous material, it was singularly free from surface noise and needle drag. It was made by carrying out the condensation of the resin in the presence of a protein—casein, in some instances—and then mixing and sheeting in something after the same style as in the case of the normal solid stock records. The pressing was performed at a temperature approaching that used in moulding bakelite.

Mr. W. OWEN said it was significant that so little information to be found in the technical Press concerning the production of gramophone records. It could not possibly be said that the subject did not merit the attention of technologists, because business to the extent of millions of pounds per annum centred around the gramophone record, and technically the subject teemed with interest. While chemists were quite interested in the dielectric constant of the diamond, for example, they did not appear to attach much importance to the granulation of gramophone waxes. There must be some factor at work which prevented those qualified to speak on the subject from so doing, and he suggested—although he had no facts on which to base the suggestion—that probably those engaged in the production of gramophone records were prevented, by some trade agreement, from discussing the subject. It was extremely unfortunate, because it tended to place this country in an unfavourable light in the technical world. Most of the articles one found from time to time originated abroad. Of the articles that had appeared in the technical Press of this country, a large proportion had been written by Mr. Courtney Bryson.

Shellac in Early Types of Records

Dr. FOSTER SPROXTON commented on the extraordinary diversity of materials from which gramophone records could be made, and asked what were the properties which determined the suitability of a material for gramophone records.

Dr. L. A. JORDAN (director, Research Association of Paint, Colour and Varnish Manufacturers) said that the subject was of remarkable importance because it joined up to an outstanding degree mechanical, chemical and physical work. With regard to materials, the old-time record was made of shellac, and he would like to hear from people generally what was wrong with shellac. It was admitted that it gave a remarkably good performance, and apparently nobody had ever questioned that, except on the score of breakability. Did unbreakability really matter, or was it merely the outward and physical sign of some other condition?

Mr. A. J. GIBSON said he had visited a number of gramophone factories in the United Kingdom and one in Germany. They had all admitted that for sound recording on a gramophone disc there was nothing to equal a good shellac. Perhaps another factor, in addition to the price factor, was that of the electrical recording of sound, which magnified many times over the defects in any recording service. For instance, in the synchronised talkies, where the large 16 in. diameter disc was used, played from the periphery inwards, it was found that any defect in the surface or the physical condition of the material resulted in a most discordant noise. That had given rise to research into the effect of too high a proportion of wax in the shellac mixture, and the gramophone companies had found by experiment that $1\frac{1}{2}$ to $1\frac{3}{4}$ per cent. was the optimum amount. Unfortunately, however, the shellac insect required an average of 5 per cent., and the companies had had to look round for something which would anchor or immobilise the excess wax. Ultimately they had managed to

get a specification which varied, unfortunately, from company to company. An important advantage of shellac was that if made into a record which ultimately became broken, this record could be ground up again, melted and re-used. Good shellac would stand re-melting and moulding quite a number of times. One of the most important tests of a suitable shellac was its capacity to withstand a temperature of 150° C. for a long period of time—a matter of half an hour or more—which property was not possessed by the substitute products. If the producers of shellac would realise that the manufacturers wanted some stability of price and quality, shellac would retain its position as the premier raw material.

Stabilising the Shellac Market

Mr. GEORGE DRING said it seemed that the manufacturers of synthetic resins were likely to be in a very invidious position, for, having put a good deal of money into their work, they would be helping the gramophone record manufacturers to stabilise the shellac market, for the latter could threaten to use synthetic resins to replace shellac. It seemed that this was not a very happy position for the synthetic resin manufacturers who were trying to enter the gramophone record field, because he assumed that gramophone record production really controlled the price of shellac in the world. With regard to home recording and reproduction, Mr. Dring asked what hardness was required for recording and for reproducing, and whether it would be possible to find a material which had the hardness necessary for recording, and which could be converted into something having the hardness necessary for reproduction. It seemed that there was no material other than the gelatin, which was not altogether suitable.

Mr. C. A. O. RIDEAL, referring to cellulose acetate, said that in a recent manufacture it had been found that considerable time could be saved if the record were moulded at a lower temperature than usual, so that it had not to be cooled before it was taken out of the stamper. That meant, however, that a softer material would have to be used, which could be pressed into a record at the lower temperature. The manufacturers of the material, however, had always considered that unless a material such as celluloid or cellulose acetate was pressed at the actual plastic temperature and cooled under pressure, the mouldings would not remain in position indefinitely. Therefore, he asked whether, by merely pressing the material at the lower temperature, and not cooling, there was a possibility that the recordings might be removed from the material later and that the grooves might vary in size.

A High Percentage of Scrap

Mr. COURTNEY BRYSON, replying to the discussion, said that one of the attractions of unbreakable records was not so much their unbreakability, but their thinness and portability. But, on the other hand, the question of quality had to be considered, and he had noticed that some of the expensive records in America, on which operatic music was recorded, were about half-an-inch thick. The only criterion of the quality of a record, so far as he knew, was the ear. As to the size of grain surface, he said the material for the solid stock records was ground in various types of machines so that 97 per cent. would pass a 200-mesh sieve. That was the standard grinding, and he believed that actually about 91 or 92 per cent. would pass a 300-mesh sieve. Regarding a method of measuring the coefficient of friction, the best test he knew of was to put a record on a gramophone with a weak spring and ascertain if the needle dragged. Coefficients of friction were unreliable. He would not like to give, without further consideration, a list of the properties desired in a gramophone record. Obviously, however, it must have very good wearing properties: it must not be abrasive, because otherwise the needle would be worn into shoulders; the coefficient of friction between the record and the steel needle must be reasonably low. For manufacturing, the material must be very plastic, it must take a very accurate impression, and the shrinkage on cooling must be reasonably small, because otherwise the record would stick to the stamper. As to the use of scrap, the standard formula for a very large gramophone company provided for 40 per cent. of scrap records. The examination of records was very severe, and they were thrown out by reason of faults which to most people would be practically imperceptible. These records were reground and remixed. When using synthetic resins for making records it was necessary to ensure that the percentage of faulty ones was low, but one could use up to about 20 per cent. of scrap.

Next Year's British Industries Fair

Preliminary List of Chemical Exhibitors

THE Department of Overseas Trade announces that already, some three months before the opening date, the number of overseas buyers who have signified their intention to visit the British Industries Fair at Olympia and the White City, London, and Castle Bromwich, Birmingham, next February is more than 30 per cent. larger than the corresponding number last year when the attendance of buyers set up a record. The Department sends invitations to some 67,000 buyers in about 100 different overseas countries and territories. Replies this year have been prompter than ever and especially marked interest is shown by letters received from buyers in Holland, Germany, Denmark, Belgium and France. Most of the Scandinavian countries will be well represented.

The Fair, which will be held from February 20 to March 3, will be larger and more varied than any of its predecessors. The area booked by exhibitors at Olympia and the White City is 21 per cent. larger than that occupied at the last Fair and additional buildings to accommodate more exhibits have been made necessary at Birmingham. Following are the preliminary lists of chemical exhibitors at Olympia.

Chemical Section.

Albright and Wilson, Ltd.
F. Allen and Sons (Poplar), Ltd.
Aquamellis Eng. Co., Ltd.
Assen. of British Chemical Mfrs.
A. Boake Roberts and Co., Ltd.
British Industrial Solvents, Ltd.
W. J. Bush and Co., Ltd.
Carbon Dioxide Co., Ltd.
Ferris and Co., Ltd.
T. B. Ford, Ltd.
Gas Light and Coke Co.
General Chemical and Pharmaceutical Co., Ltd.
High Speed Steel Alloys, Ltd.
Howards and Sons, Ltd., and Hopkins and Williams, Ltd.
Imperial Chemical Industries, Ltd.
Imperial Smelting Corpn., Ltd., Frickers, National Smelting Co., Ltd., and Orr's Zinc White, Ltd.
Johnson and Sons Mfg. Chemists Ltd.
T. Morson and Sons, Ltd.
Reeves and Sons, Ltd.
Society of Chemical Industry.
South Metropolitan Gas Co.
Spencer, Chapman and Messell, Ltd.
Tett Bros., Ltd.
T. Tyrer and Co., Ltd.
Whiffen and Sons, Ltd.
Williams (Hounslow), Ltd.

Druggists' Sundries Section.

R. Addis and Son.
Albion Soap Co., Ltd.
Anzora Perfumery Co., Ltd.
Bathes Drug Stores.
L. Batley and Co.
Bellchambers Glass Bottle Co. and Deptford Glassworks, Ltd.
A. Bourjois et Cie, Ltd.
Bridgen and Griffen, Ltd.
T. F. Bristow and Co., Ltd.
E. N. Bromage and Co.
H. Bronnley and Co., Ltd.
F. C. Calvert and Co.
The Comfex Mfg. Co., Ltd.
Corfield, Ltd.
T. W. Culmer and Sons.
Cupal, Ltd., and E. James and Son.
Cussons, Sons and Co., Ltd.
Druggists Specialities, Ltd.
Dubary et Cie.
Enolin (1926), Ltd.
Faudels, Ltd.
The Florence Rutter Co., Ltd.
The Florogen Works.
Freers Manfg. Co., Ltd.
General Kaputine Syndicate, Ltd.
Heath and Hygiene, Ltd.
R. Hovenden and Sons, Ltd.
F. Hulse and Co., Ltd.
J. G. Ingram and Son, Ltd.
Lacco Proprietors, Ltd.
H. S. Lovell and Co.
Macleans, Ltd.
Ch. Midgley, Ltd.
Hopes Soaps.
W. T. Owbridge, Ltd.
Ozonol Laboratories, Ltd.
Perox, Ltd.
Potter and Moore, Ltd.
Redio Co., Ltd.
Reliance Rubber Co., Ltd.
Rigby Battcock, Ltd.
W. J. Robson and Co.
Shavex Zee Kol Company, Ltd.
Solport Bros., Ltd.
Standard Tablet Co., Ltd.
Union Jack Paste Co.
Viscose Development Co., Ltd.
The Vulfix Shaving Brush Co., Ltd.
The Auto Steel Co.
Wee Kura, Ltd.
R. F. White and Co., Ltd.
W. Wren and Co., Ltd.
Trade Commissioner for Mysore in London.

Use of Soda Ash in Foundry Practice

Improving the Quality of Cast Iron

THE use of soda ash for the purpose of improving the quality of cast iron was the subject of a paper which Mr. N. L. Evans read before the British Cast Iron Research Association and the London Branch of the Institute of British Foundrymen at a joint meeting held at the offices of Imperial Chemical Industries, Ltd., London, on December 1.

Soda ash, Mr. Evans stated, was rapidly establishing itself in this country as one of the cheapest means of improving the quality of cast-iron and helping it to meet the demands made on it by modern requirements. First used simply as a desulphurising agent, it had been found to have a marked refining and degasifying action. It helped in the production of sounder castings, which could be more easily dealt with in the machine shop, and its effects on the economic side of foundry work could not be neglected. Some of the branches in which the soda ash process had already gained a firm footing were the manufacture of refined pig-iron and alloy pig-iron, heavy grey iron castings, particularly those used in chemical plant, converter steel castings, malleable castings, and motor cylinder and other high grade castings which have to withstand pressure.

Soda ash as supplied for foundry use could be in the form of a granular powder or as fused blocks. In the form of a granular powder (" dense soda ash ") it was used in the ladle or receiver, being simply thrown into the bottom and the metal being tapped on to it. After time had been allowed for the reaction to take place the fluid slag which rose to the surface was thickened with ground limestone and removed with a deslagging tool. In the case of large castings there was practically no increase in the time taken, as the metal frequently remained in the ladle for half an hour or longer. The reaction was exothermic, and the fluidity of the iron was increased by the removal of sulphur. When time was a vital factor, as when small hand shanks were filled direct from the cupola for making castings of thin section, or in casting white iron for malleable, which required a very high temperature, then the use of the soda ash in the form of fused blocks was recommended. The blocks weighed 4 lb. each, and were added to the cupola charge at the same time as the limestone. This method was not quite so efficient as the ladle method from the point of view of the removal of sulphur, but it had a marked effect on the general structure of the metal. In both forms the reagent consisted of pure anhydrous sodium carbonate, and the amount used was usually 0.5 to 1 per cent. of the weight of iron treated.

Points from the Discussion

Mr. J. G. PEARCE (director and secretary, British Cast Iron Research Association) gave details of experiments carried out by that body which confirmed the results set out in the paper. Speaking of the use of soda ash blocks in the cupola, he said this was an ingenious suggestion to overcome the difficulty of dealing with small ladles, but there was very little experience of this yet and the results of the use of blocks would be watched with interest. Since most cupolas had a siliceous lining, the possibility of action between the ash and the lining was always present. It also did not appear how the degasifying action of soda ash in the ladle could be made effective. The use of soda ash had other beneficial effects.

Mr. J. DESCHAMPS asked whether the soda ash process could be applied to steel, although personally he doubted it owing to the very high temperature necessary. He pointed to the reduction of silicon by the use of the soda ash process and suggested this was a drawback of the process. Also, experience had shown that the best effects were obtained with soda ash if it was introduced when the metal was at a very high temperature. His experience had also shown that better desulphurisation was obtained if the lining of ladles was a neutral refractory. With such a lining he had obtained from 280 to 300 heats without relining, whereas with firebrick linings the ladels did not last more than one or two days. He added that his firm had been using soda ash since 1926 and had treated some 30,000 to 40,000 tons of metal in this way. In 1926 he was told that more than two million tons of cupola metal were being treated annually in America by the soda ash process, and he asked if any figures of the total amount treated in Great Britain to-day were available.

Mr. E. W. Colbeck, who has been associated with Mr. Evans in this work, gave details of experiments indicating the beneficial effect of soda ash upon the corrosion resisting properties of metals used in chemical and similar plant.

Mr. F. W. LUTYENS (chairman, Alkali Group, I.C.I.) expressed the desire of the Group to give every possible assistance to foundrymen in applying soda ash and said that experts would be sent out to give advice and assistance free of charge.

Manufacture of Soda Ash Blocks

Mr. EVANS, replying generally on the discussion, agreed that the process cannot at present be applied to steel because owing to the violent reaction there was a danger that the steel might be thrown out of the ladle and cause serious injury. As far as present knowledge went the process was most efficient between a range of temperature of 1,300° to 1,400° C. Theoretically, neutral refractories should give better results but under ordinary conditions of use soda ash did not reduce the life of the ordinary ladle to less than a day's continuous use and the ladles were usually redaubed daily. The only real answer to the difficulty was to use an aluminous firebrick which was very expensive, but foundrymen who had carried out practical trials assured him that the additional cost was compensated for by the longer life. The best method of adding the soda ash was to put it in the bottom of the ladle, whilst heating the ladle was an additional advantage. As to the manufacture of soda ash blocks, experiments had been made by hydrating the soda ash. The disadvantage, however, was that if such blocks were used in the cupola, as soon as the temperature reached 100°, and the water was driven off, the blocks crumbled. That occurred when the hydrated blocks were high up in the cupola and the blast then disintegrated the soda ash and a great deal of it went up the stack without having had any effect. Some blocks had been made by fusing soda ash but this was an expensive process, although it undoubtedly gave the most satisfactory form of block when it was necessary to use soda ash in a cupola as distinct from the ladle. In the ladle, however, there was really no advantage to be gained by going to the expense of fusing and ordinary dense ash in granular form was the cheapest and most satisfactory. The reduction of silicon content was usually quite small, but he admitted it was one of the factors not yet fully understood.

Modern Scientific Instruments

The Physical Society's Annual Exhibition

THE twenty-third annual exhibition of scientific instruments and apparatus, arranged by the Physical Society, will be held on January 3, 4 and 5, 1933, at the Imperial College of Science and Technology, South Kensington. It will be open in the afternoons from 3 p.m. to 6 p.m. and again in the evenings from 7 p.m. to 10 p.m. Leading manufacturers of scientific instruments will be exhibiting their latest products in the trade section. The research and experimental section will contain contributions from most of the important research laboratories in Great Britain, and there will be a special subsection devoted to experiments of educational interest. In addition, the work submitted for the craftsmanship competition by apprentices and learners will be on view.

Discourses will be delivered each day at 8 p.m. On January 3, Dr. Allan Ferguson will deal with " Surface Tension and its Measurement "; on January 4, Mr. R. A. Watson Watt will lecture on " Cathode Ray Oscillography," and on January 5, Mr. F. Hope-Jones will deal with " Time Measurements: Old and New," each lecture being illustrated by experiments.

Members of institutions and scientific societies may obtain tickets from their secretaries; tickets may also be obtained from the exhibition secretary, 1 Lowther Gardens, Exhibition Road, S.W.7. Admission on January 5 will be free, without ticket.

The Menace of Insect Pests in Stored Foodstuffs

Fumigation as a Means of Destruction

A JOINT meeting of the London Section of the Society of Chemical Industry and the recently formed Food Group, was held at Burlington House, on December 5, when papers dealing with the problem of insect pests affecting stored products were read and discussed. Mr. G. W. Monier Williams, chairman of the London Section, presided.

Professor J. W. MUNRO, in the first paper, gave a brief survey of some work carried out by the Imperial College, following a request by the Empire Marketing Board in 1927, on insects affecting foodstuffs and other produce, with special attention to the possibilities of reducing wastage. The work was divisibile into three main sections, comprising survey work at the docks, research work in the laboratory and the application at the docks of the results of the research. The three chief products he dealt with were cocoa, tobacco and dried fruits. One report had already been published dealing with cocoa, another dealing with tobacco was almost ready for publication, and a further report was promised on the fruit problem. In the course of this work, efforts had been made to find out whether the conditions at the docks, conditions of temperature and humidity particularly, were favourable to the increase of insect life and, if so, whether anything could be done to modify those conditions. The British Association of Research for the Cocoa, Chocolate, Sugar Confectionery and Jam Trades had already commenced work on cocoa from the point of view of the manufacturer.

Resistivity of Insects

Dealing with the methods of extermination of insects, Professor Munro said that not only id the different species of insect possess different degrees of resistance to lethal methods, but the different stages of development of each species of insect—the egg, the larvæ and the pupæ stages—also exhibited different reactions. For example, during the first three days' development of the egg of the flour moth, the time occupied to destroy it by subjecting it to a temperature of 47° C. and 8 per cent. relative humidity was five hours. On the fourth day's development of the egg, the time required would be something over four hours, and on the fifth, two hours would be sufficient. The larva was relatively non-resistant; twenty-five or thirty minutes would suffice in the early stages and at later stages about three-quarters of an hour. When the larva was fully grown and had stopped feeding and was ready to turn to the pupa stage, its resistance increased, and the time required would be up to two hours, after which there was a fall. It had also been found that the pupa of the female was more resistant than that of the male. The adult insect was not highly resistant. Professor Munro emphasised the importance of the variation of resistance at different stages, and pointed out that if the chemist did not recognise that variation he was likely to go very far wrong in advising methods of destruction. He gave particulars of the resistance of different species of insects to a temperature of 47° C. and 8 per cent. relative humidity, showing that whereas the flour moth succumbed fairly readily, the Khapra beetle (known to distillers and brewers) would not be destroyed even on exposure for 16 hours. Other insects succumbed in various lengths of time.

Professor Munro then dealt with the use of gases for fumigating, and indicated the concentrations of carbon disulphide and ethylene oxide, which would give 100 per cent. kill of adults, larvæ and pupæ. The figures showed that temperature had a very marked effect on the toxicity or capacity to kill. For example, at 50° F. much larger quantities per litre were necessary than at higher temperatures. The temperature at which the insects had been kept before fumigation also had an influence upon their powers of resistance. He emphasised that in fumigation and sterilisation work some knowledge of entymology was of the highest importance.

Measurement of Gas Concentration in Fumigation

Dr. A. B. PAGE (who has charge of the chemical section of the work) discussed methods of measuring gas concentrations in a fumigated space. The aspiration method and the vacuum bottle method were available. It had been found that for really big-scale work the vacuum bottle method was the only practicable one, and he described modifications which had been made to the apparatus, as a result of which the vessels could be placed in any position in a ship or warehouse and would give a fairly good idea of what was happening inside the gas space. He also indicated the methods used for sampling inside packages and bags.

It had been shown that the average maximum concentration developed in a fumigated space was seldom more than half that calculated on the dosage and volume, although there might be very high concentration locally. In the course of the work it had been shown that more open sacking than was sometimes used was essential in order that the gas should get about at reasonable speed. (The application of heat was also useful in setting up convection currents to assist the spreading of the gas. Again, whereas in a reasonably well packed barge 30 lb. of ethylene oxide would produce the concentration required, in a badly packed barge, 56 lb. would not produce the required concentration. Some work had been done with a view to securing uniform concentrations throughout a warehouse, by taking samples at different levels, *i.e.*, the ground level, the level of the eaves and the level of the ridge of the building, and it was found that the liberation of gas near the ridge—when the temperature was as low as 10°C—led to convection currents and there was fairly good distribution in the rest of the building. By liberating the whole of the gas from jets on the ground, remarkable layering effects were produced, and in some cases layers had been found to persist for 27 hours.

Chemical Aspects of the Cocoa Moth

Dr. L. E. CAMPBELL discussed the chemical aspects of controlled infestation, particularly with regard to fumigation of cocoa beans. It was pointed out that the manufacturer might be supplied with insects in cocoa beans, but there was no danger of infestation coming through to the finished product, for any forms of insect life that existed were killed in the course of roasting or any other process in the course of chocolate manufacture. The only possible danger was that some moths might escape from beans before roasting and might lay eggs subsequently. Experiments were carried out in order to determine whether fumigated beans could be accepted as absolutely safe, the two principal fumigants being hydrocyanic acid and ethylene oxide, and the amounts of residual hydrocyanic acid found in cocoa beans at intervals after fumigation and at various stages of manufacture of chocolate and cocoa were investigated. Thirteen hours after the completion of fumigation of a barge load of beans the HCN content was up to 43 parts per million. A week later it had decreased to ten parts per million and, after roasting, it was reduced to five parts per million. The chocolate, after refining, had contained no detectable trace, and cocoa cake, after pressing out the excess fat, also contained no detectable trace. As a precautionary measure, samples of chocolate and cocoa were tested at later stages of manufacture and the results were negative. There was evidence that even if the dosage had been larger there would have no HCN in the finished product.

Ethylene Oxide as a Fumigant

Ethylene oxide appeared preferable to hydrocyanic acid in some respects, and he believed it was being used in fairly large quantities in America. There had been a tendency to regard it with some suspicion because it affected the germinating powers of wheat in certain circumstances, though that did not appear to hold in the case of wheat bulk. Waite, Patty and Yant, however, as the result of experiments on animals had concluded that ethylene oxide was less toxic than hydrogen chloride, and sulphur dioxide, and that it was similar to ammonia. Ethylene oxide formed glycol with water, so that any toxic action of traces in foodstuffs containing moisture would probably be due to glycol. Its toxic action had been attributed to the oxalic acid formed in the body. Oxalic acid, however, was of common occurrence in the vegetable kingdom. Calculation had shown that if ethylene oxide was used as a fumigant at the rate of 2 lb.

per 1,000 cu. ft., of air space (which was normal), and if 15,000 lb. of materials were fumigated per 1,000 cu. ft., and if all the ethylene oxide were absorbed entirely by the material and then converted entirely into oxalic acid, the amount produced would be about one-tenth the amount of soluble oxalate found in rhubarb. Probably the amount actually found would be less than one-tenth of that estimated amount. A disadvantage of the use of ethylene oxide, however, was that existing methods of determining small traces of it in foodstuffs were almost certainly grossly inaccurate.

Points from the Discussion

Dr. HEERDT said that in Germany five or six factories had been fumigated, as had also quite a number of chocolate factories in the United States, and there was no deleterious effect upon the products of those factories. Ships were constantly fumigated with HCN. The fumigation of flour mills was quite usual, and so far no harmful effects had been noted in the manufactured goods. The maximum concentration which had been reached in a factory, and only for a short time, under absolutely practical conditions, was 80 per cent., *i.e.*, 80 per cent. of the account of gas actually put in. He pointed out also that the application of heat in practical work was difficult. It was necessary that a good technique of extermination should be developed.

Dr. F. H. CARR, past president of the Society, asked if this work would not lead to the chemical engineer being asked to devise suitable methods for putting material through a process at the point of departure from a big warehouse to the factory, so that on its departure it could be accepted as being reasonably sterile.

Mr. MACARA said that the Cocoa Association of London and the Manufacturing Confectioners' Alliance had set up a joint committee to deal with the subject, and its aim was not to assist or encourage fumigation, but to endeavour to find preventive methods which could be adopted in the countries in which the products originated. Unfortunately, the infestation was not always obvious in the countries of origin. He emphasised, however, that a very large percentage of the cocoa which came to this country was free from infestation. Fumigation might be useful as a stop-gap, but it was hoped that sooner or later it would not be necessary.

Professor MUNRO, in the course of his reply, said that whilst toxicity of eggs was higher than that of the pupæ, larvæ and adults, there were concentrations of gas which were fatal to the eggs. There had been used a combination of carbon bisulphide and carbon tetrachloride, and he did not think that the egg stage would present unreasonable difficulties. Representations had been made in all parts of the Empire where these products were produced, and it was hoped that something would be done to prevent infection of the goods at the countries of origin. The condition of the packing sheds was also an important factor; if the packing sheds were clean, the chances were that the food was reasonably clean on its arrival here.

A Review of Recent Scientific Progress

Results of Experiments on the Atom

THE 270th anniversary meeting of the Royal Society was held on November 30 at Burlington House. Sir F. Gowland Hopkins, in his presidential address, mentioned that the Royal Society Mond Laboratory at Cambridge, towards the building of which they provided £15,000 from the Mond fund, was now practically complete and would be opened early in February next.

In a review of some aspects of scientific progress, the president referred to two organised discussions which were held during the current year. He said he should have found it impossible, in any case, to omit some reference to the discussion, opened by Lord Rutherford in person, on the structure of atomic nuclei. The occasion was remarkably timely, for after a date was fixed for it, but before that date arrived, certain pregnant researches had brought forth supremely important data, with a final rapidity which, he thought, had been unexpected by all concerned. The revelation of those new experimental results and of their great significance gave a dramatic character to the discussion which was felt by all who were present. The atomic nucleus for a long time had seemed to be an impregnable fortress; but missiles of high destructive power had been gradually contrived by almost magical skill in the army of attack, and the fortress, in spite of its formidable potential barrier, was crumbling.

Cockcroft and Walton's Success

It was not unjustifiable to say that before the moment of Cockcroft and Walton's success man did not know how to release atomic energy on his own initiative, whereas now, though doubtless in a limited sense, he possessed that power. At the same time the phenomenon of transmutation seemed to be at hand in full reality.

The second discussion dealt with the growth of knowledge at a different level of present accomplishment; but with phenomena that were very significant. It was concerned with recent studies of the nature and properties of those highly active catalysts—the enzymes—the presence of which in each living unit converted a system, which without them would be static, into an organism which was so characteristically dynamic.

Anyone who read in succession the records of those two discussions would perhaps be tempted to wonder how soon, if ever, intellectual concepts, based upon the phenomena which were the subject of the first, were fated to invade, and perhaps revolutionise thought in the great field of which the second covered part. Would the data of atomic physics ultimately illuminate the processes of life? An interesting question for all biologists. At present they knew nothing to suggest a certain answer.

Recent Studies

Certain recent experimental studies seemed to have proved that living tissues might be the seat of radiations able to produce effects at a distance, and to suggest that certain activities in one cell of a tissue could thus influence activities in neighbouring cells. It was claimed some time ago by Gurvitsch, a Russian biologist, that when growing cells divided they emitted rays which accelerated the processes of division in other cells. The existence of these mitogenetic rays met at first with general disbelief, but work by many during the last year seemed to have brought satisfactory proof that chemical reaction in living tissues were indeed accompanied by radiations, and that events in one cell might thus influence other cells without material transmission. Biochemistry had escaped from the dilemma voiced in earlier dogma—namely, that since chemical methods must at the very moment of their application convert the living into the dead, they could do nothing to elucidate the dynamic events of life. The escape was more real than might seem on a superficial view, and especially real perhaps to those who were themselves applying modern chemical methods in the biological field.

The Duke of York was present at the dinner in the evening at the Mayfair Hotel. Responding to the toast of his health, he expressed gratitude to the Society for the honour done him in making him a Fellow. The toast of the Royal Society was given by Mr. Runciman, President of the Board of Trade.

Increased Output of Czechoslovak Alcohol

THE Czechoslovak annual contingent for the output of alcohol during the production year beginning September 1, 1932, is expected to be increased to 1,000,000 hectolitres in view of the compulsory mixing of alcohol and gasoline for motor fuel made effective September 1, 1932. The previous season's contingent was placed at 580,000 hectolitres, while actual sales of alcohol totalled 529,534 hectolitres, compared with 562,913 hectolitres in the 1930-31 season. Of the 1931-32 alcohol contingent 430,000 hectolitres were allotted to 878 agricultural distilleries and 150,000 hectolitres to 38 industrial distilleries.

The Safe Handling of Chemicals

By WARREN N. WATSON

WE give below extracts from another paper which was presented at the 21st annual congress of the National Safety Council, held at Washington, October 3-7. The author, in this case, is secretary to the Manufacturing Chemists' Association.

SAFETY work from the chemical viewpoint may be grouped under three general heads: firstly, precautions in manufacture; secondly, safety in transportation, which is primarily a problem of containers and packages; and thirdly, precautions for and by the consumer (industrial or ultimate). As the industry is fundamentally a producer of materials for further manufacture only a minute fraction of the total consumption of chemicals reaches the ultimate consumer as such. The latter class includes such products as medicinals, cleaning preparations, and insecticides.

There are certain fundamental principles—most of which have been thoroughly tested by experience—available for the protection of the ultimate consumer of chemicals and chemical products. While some of these are required by law, others have been developed by the manufacturers in the interests of safeguarding the consumers of chemical products. These principles include: (1) symbols; (2) poison labels; (3) characterisation by colour, odour or taste; (4) special agencies; and (5) informative and precautionary instructions. Each has distinct advantages and clear limitations for a particular field or class of products and only by the intelligent use of these agencies can the desired result be accomplished. In the United States the outstanding symbol is the skull and crossbones. In the mind of the general public this is associated with highly toxic products. Careful study shows that for many people who disregard poison labels and instructions, the skull and crossbones is an effective warning. This may appear to be a commentary on human laziness, but we must deal with facts and not theories in safety practice. The skull and crossbones occupies an important part in our social structure and efforts to extend its use to relatively-harmless or harmless products can only result in public indifference to this important symbol and tend to destroy its warning value. In recognition of the value of a symbol as an element of warning the Manufacturing Chemists' Association is now developing a symbol for "inflammables" along the lines of a scarlet red flame and are considering the development of a symbol for volatiles. Under the symbol class falls the use of a picture in lieu of language. The right and the wrong way to remove a carboy stopper can be illustrated as a safety measure for the consumer.

Use of Warning Colours

The application of these principles is in general relatively new, but the use of colour, while limited, is not new. Two important applications of colour as a protective warning are in gasoline containing lead tetratethyl and also for methanol sold for the anti-freeze trade. The use of colour in these two products has worked out successfully. The indiscriminate extension of colour to a variety of poisons is to be seriously questioned due to the fact that the use of colour in foodstuffs is extremely common and is rapidly increasing. The association conducted last summer, in co-operation with Federal and State experimental stations in 22 States, field tests with calcium and lead arsenates, coloured with different dyes and pigments, in order to ascertain the feasibility of the use of colour for white insecticides.

The practice of characterisation by odour and taste is limited. The voluntary formula adopted by the manufacturers of methanol in co-operation with the United States Public Health Service includes, in addition to colour, chemical products which impart a distinctive disagreeable odour and taste and also an emetic. The use of strong odours in general meets with strong opposition from the consumer. Denatured alcohol is another item which has been treated with products possessing a disagreeable odour and taste. Under this category falls a variety of devices, such as the use of an emetic in methanol, the use of a string in bichloride of mercury tablets to reduce the possibility of a tablet being swallowed by mistake, and the preparation of tablets of a different shape and colour, such as a triangular tablet in contrast with the circular tablet used for internal preparations. In addition, the prohibition of sales of a poisonous article in broken unlabelled packages has merit. Concretely this would mean that the country store could not sell calcium arsenate from a 100 lb. drum in unlabelled bags containing a few lb. which might conceivably be mistaken for foodstuffs.

Overlooking the Fundamental Factors

The use of precautionary language is bound to increase as the diversity of products expands. To be effective, it must be clear, accurate, brief and readily understandable. For example, it has been suggested that a skull and crossbones be placed on carbon tetrachloride containers. A more careful examination of the facts shows that this conclusion overlooks a fundamental factor; carbon tetrachloride is now used in the household and also in commercial dry-cleaning establishments as a substitute for highly inflammable petroleum solvents, such as gasoline. The very high death rate from gasoline fires in the household clearly shows the advantages of a non-inflammable solvent. The practical effect of labeling carbon tetrachloride with a skull and crossbones and the poison label would be to drive this article out of the household and result in a re-adoption of hazardous gasoline, with a subsequent increase in the destruction of human life. The precautionary statement for tetrachloride containers along the following line "Use in a well ventilated place" would appear to meet the needs of all. The replacement of air by any gas or vapour results in asphyxiation or toxic effects (or both); consequently adequate ventilation is the essential message to the consumer. This recognises the principle that adequate ventilation should be provided when volatiles are used.

The Manufacturing Chemists' Association is in its sixty-first year and one of its principal activities has been a continuous research programme on chemical containers and the handling of chemical products. Progress in the field of chemical containers has kept pace with the remarkable developments in the chemical industry itself. This programme necessarily has a direct relation to safety and it has been the consistent policy of the Association to place safety first in the development of new containers. The safe shipment of chemicals is primarily a problem of safe containers, plus a knowledge of how to handle them. In the furtherance of the research work they have special committees—the Steel Barrels and Drums Committee, the Carboy Committee, the Tank Car Committee, the Poisonous Articles and Miscellaneous Packages Committee, and the Manual Committee—each devoted to study of a special type of container.

Work Already Accomplished

A survey of chemical handling revealed the necessity of further precautionary instructions for the consumer of chemicals in a uniform co-ordinated form, and the Manual Committee has directed its efforts to that end. The purpose is to disseminate information to the public and interested parties on procedure and precautions to be observed in the handling of chemicals and their containers. Such manuals are written for the consumer, the producer and the shipper, with special emphasis on safety.

The principal source of accidents arising from carelessness has been on the part of the industrial and ultimate consumer. It has accordingly been found desirable in certain cases to prepare a manual for the consumer and a separate manual for the manufacturer. Sulphuric acid is shipped in carboys, steel drums and tank cars. In the handling of sulphuric acid and mixed acid in steel drums, one manual has been published for the shippers and a second manual for the consignees. The latter covers explanatory statements as to the cause of explosions by hydrogen and storage without venting. Specific instructions are given under the heads of handling, storing, venting, the removal and replacement of the body plug, the avoidance of flame, emptying, draining and closing, and internal washing. The instructions under each of these headings are very brief and the manual sheet can be posted in the rooms of the consumer plants where the workmen handle these drums. Foremen can instruct their workmen and the workmen themselves also have access, under these conditions, to

these instructions. The manual for shippers of sulphuric acid in steel drums is more comprehensive and covers such topics as inspection, storage, cleaning, testing and repairing.

For the safe transportation and handling of drums containing acids and volatile products, the Manufacturing Chemists' Association have developed a standard label which, in actual use, is pasted next to the bung on the steel drum. There are first, two brief statements for the benefit of the employees of the transportation companies, and second, there are seven short statements for the consignee. These labels are available to the public at a small cost and are finding extensive application. A special manual S.25 covers bulk shipments in box cars of nitre cake, giving loading instructions, treatment of cars before loading and treatment of cars after unloading in order to leave the car in proper condition for the shipment of other freight. Another manual covers the cleaning out of box cars after unloading the I.C.C. Class "B" poisons, which include such products as calcium arsenate and lead arsenate.

Manuals are now in preparation for the handling of carboys; for the unloading of acid tank cars covering both the sulphuric acid tank car and the rubber-lined tank car used for hydrochloric acid; and a manual for the consumer of arsenical insecticides containing instructions for their safe use. The development of the manual will permit the coordination under one cover of safety measures for the handling of chemicals of all kinds by the shipper, carrier, and consumer in a convenient form and it is hoped that the uses of these manuals will result in a reduction of accidents.

Italian Chemical Industry

Big Post-War Development

BEFORE the war, the Italian chemical industry, though active in some branches, was not very thriving. It lacked the confidence it needed in Italy, and the markets were dominated by German chemicals. The war was responsible for a change in the situation; on one hand chemicals were required and could not be imported, and on the other hand hopes were raised as to possibilities of producing chemicals in Italy for home use when prosperous times should come. After the war the industry was in a healthy state, and the situation was further improved with the advent of Fascism. Round about 1926, when Italian industry was so bad, the chemical industry alone developed well. The annual output of agricultural fertilisers is now about £50,000,000, employing about 82,000 workers. The output of artificial textile industries is about £6,000,000 per annum and employs about 28,000 workers. In the rubber industry 18,000 workers are employed and the annual output is about £7,000,000. The sugar industry employs about 28,000 workers producing about £10,000,000 per annum. Exports last year of the whole industry was about £15,000.

Trade in Bergamot Essence

New Italian Decree-Law

UNDER an Italian Royal Decree-Law which is at present in course of publication, full liberty is again granted to the trade in bergamot essence of new production, no alteration being introduced in the rules regarding the supervision, issued for the purpose of guaranteeing the genuineness of the exported product by means of an analysis by the R. Stazione Sperimentale per le Essend (R. Experimental Station for Essences) of Reggio Calabria and the securing of the containers by means of a special seal. According to information received from the Italian Chamber of Commerce in London, the Consorzio Produttori di Bergamotto (Union of Bergamot Producers) is entrusted with the task of withdrawing all the essence of old production, which will be used for other purposes than perfumery. Foreign consumers should, therefore, purchase the essence from their usual suppliers, from whom, as a guarantee of the genuineness and origin of the product, they should stipulate that the consignment be accompanied by an analysis certificate issued by the R. Experimental Station of Reggio Calabria (in which the year of production is stated); that the cases be sealed by the lead seal of this station; and that the containers be of aluminium

New Dyestuffs Licences

Applications in November

THE following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during November has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee. The total number of applications received during the month was 564, of which 504 were from merchants or importers. To these should be added six cases outstanding on October 31, making a total for the month of 570. These were dealt with as follows:—Granted—540 (of which 538 were dealt with within seven days of receipt); referred to British makers of similar products, 23 (of which 21 were dealt with within seven days of receipt); outstanding on November 30, seven. Of the total of 570 applications received, 559 (or 98 per cent.) were dealt with within seven days of receipt.

Oxy-Acetylene Welding

Applications in the Beet Sugar Industry

OXY-ACETYLENE welding is now widely used for plant repairs and maintenance at beet sugar factories. The economy and ease of use for repair work on practically all of this equipment has assured it a definite and permanent place in the industry. Much of the equipment is hard-faced by the oxy-acetylene process, and elevators, trash catchers, etc., which have endless chains and soon become worn are repaired by using a brass welding rod. In the cossette conveyor of the drag type, which carries the cossettes (beet cut into small strips) to the diffusion battery, the lugs wear very rapidly, and it is now the standard practice to surface them with bronze rod. Pumps, pistons, piston rods, and valves for plunger pumps are all being successfully rebuilt and reclaimed by bronze-welding at a great saving in cost. In the case of centrifugal pumps, impellers, impeller seal ring, seats, shafts, bowls, heads, etc., are also economically reclaimed by bronze-welding.

Chemical Matters in Parliament

Chemical Glassware

IN the House of Commons, on December 5, Sir C. Cayzer, for Sir John Sandeman Allen (Liverpool, West Derby) asked the President of the Board of Trade what steps he had taken with regard to the representations made to him on behalf of the British chemical glassware industry in connection with proposals to establish factories in this country, with the assistance of alien labour, to manufacture chemical glassware, including tubing, and if he was aware of the capacity of the British industry to manufacture these products for the whole of the home market and for the Dominions?

In reply, Dr. Burgin said he had received representations to this effect and communicated them to the Minister of Labour, with whom rested the responsibility for issuing permits for the employment of alien labour. The Minister had been informed that the Board of Trade saw no reason to question the accuracy of the view expressed on behalf of the British chemical glass industry.

Sugar Beet Industry

On December 5, Sir Gifford Fox (Oxford, Henley) asked the Minister of Agriculture whether his attention had been called to the growing anxiety of those farmers who cultivate sugar beet as to the prospects of the industry when the Sugar Beet Subsidy Act expires at the end of next year; and what steps he was taking to ensure that the farmers would be advised of the future policy in this connection at the earliest possible opportunity.

The Minister of Agriculture (Major Elliott): I recognise the desirability of determining future policy in regard to the sugar beet industry as soon as possible. The hon. Baronet will appreciate that important questions are involved, but I can assure him that there will be no avoidable delay.

Mr. Charles Williams (Devon, Torquay): When dealing with this matter, will full consideration be given to a duty and no excise instead of a subsidy?

Another Year for the Dyestuffs Act

Impartial Inquiry to be Held Regarding Its Working

ON Wednesday, Dr. Burgin, the Parliamentary Secretary to the Board of Trade, informed a deputation of dye-users from Lancashire and Yorkshire at the House of Commons that the Government proposes to renew the Dyestuffs Act as a temporary measure for one year, during which time an impartial inquiry will be held into the working of the Act. The deputation, which protested against the renewal of the Act, was led by Sir Henry Sutcliffe Smith, chairman of the Colour Users' Association.

A general discussion took place between Dr. Burgin and the members of the deputation, who urged the Government not to include the Act in the Expiring Laws Continuance Bill. One of the chief points made by the Lancashire representatives was that the users had been asked four or five years ago to withdraw their opposition to the Act on the ground that it migh prejudice the formation of the cartel which British dyemakers were in process of forming with their foreign competitors. The continuance of the Act was defended at that time in order to give the makers the strategical position necessary for this purpose. The Lancashire representatives saw no reason why the Act should be continued now that the industry had entered into an agreement which, whatever its objects might have been, had unquestionably resulted in an increase in price to the consumer and the withdrawal of competition.

It is understood that Dr. Burgin, in his reply, pointed out that two years ago, when the renewal of the Act was first under consideration, there was a difference of opinion between the makers and users. This was later accommodated and the Act was renewed. The position now was that there was a distinct cleavage between the makers and the users. The Government therefore proposed to adopt neither the makers' recommendation to renew the Act for three years nor the users' proposal for its immediate discontinuance. Their recommendation would be that the Act should be renewed as a temporary measure for one year, and during that time an impartial inquiry should be held into its working.

Production of Aluminium Sulphate

New Italian Plant

A PLANT for the production of aluminium sulphate has been established at Treviglio, Italy. Up to now aluminium sulphate has mostly been imported from abroad, since the aluminium producing rocks of la Tolfa (Civitàvecchia) are not sufficient for the needs of the paper industry. The Bayer process has been adopted, and the product employed is bauxite from Istria. Thanks to the perfection of the process nowadays it will be possible to obtain the aluminium sulphate absolutely pure, such as is required by the paper industry. It will be free, in particular, from iron, titanium and silica, which are always present in aluminium obtained from bauxite. At Treviglio, the sulphuric acid required will be prepared at the plant, so that it will be free from iron. The installation, it is claimed, will produce more aluminium sulphate than any other, the actual production being about 4,000 tons per month.

Chemical Engineering in Cable Manufacture

Impregnating the Cables with Bitumen

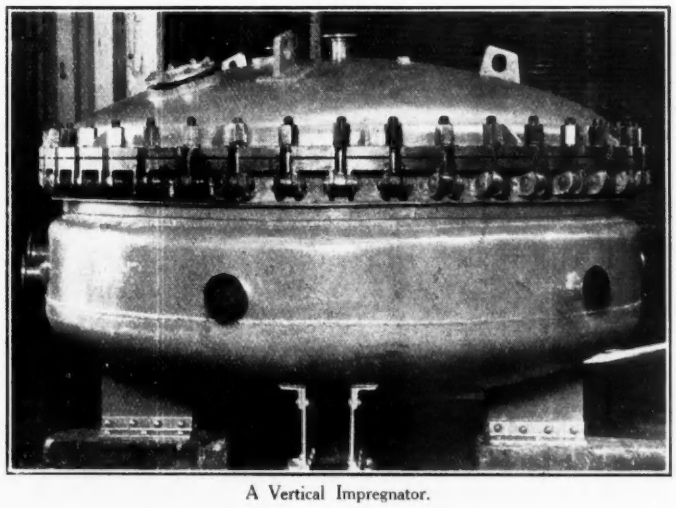
ORIGINALLY introduced for timber preservation, the process of vacuum impregnation is now applied in an important capacity in the manufacture of electric cables, coils and armatures, where the increasing tendency to use high voltages demand every effort to attain perfect insulation. The work to be impregnated is placed in a specially designed vessel where it is first dried, the moisture being driven off and condensed. When the drying has been completed a high vacuum is obtained by means of a vacuum pump, and the impregnating liquid is sucked into the impregnating vessel until the articles to be dried are completely submerged. Air is then admitted and the pressure in the impregnating vessel is raised by pumping in compressed air above the surface of the liquid. This serves to increase the penetration and make it as complete as possible. Paper insulated cables treated in this manner are used for extra high tension work, transformers are frequently dealt with by similar methods, and even the small condensers included in nearly every wireless set are impregnated with wax in a similar way.

The impregnating vessel shown in the accompanying illustration was constructed by G. A. Harvey and Co., Ltd., for the treatment of cables with bitumen. This vessel has an inside diameter of 7 ft. 5 in. with a depth of 3 ft. 9 in. from the bottom of the supporting feet to the face of the joint.

It is of electrically-welded construction of ½-inch plates, and the removable cover is secured by swing bolts and fitted with sealing device, sight and light glasses. The inside of the impregnator is fitted with a tray for carrying the cables.

The working pressure in the steam jacket is 20 lb. per sq. in. and inside the pan 35 lb. per sq. in., which can also, in addition, be worked under a vacuum.

Wood is also treated by vacuum impregnation for the purpose of staining. The ordinary methods of wood staining only colour the outer surface. If, however, wood be treated in a vacuum and pressure impregnating apparatus, it is possible to colour right through the mass. This method of staining has been applied industrially in the pencil industry in such a way as to enable cedar wood of uneven colour to be utilised and also to enable pencils to be made from other woods which have been stained to a cedar colour. Even the leads used in the making of pencils are now impregnated under the vacuum with fatty materials. More recently the same principles have been used for securing penetration of gases into porous materials, *e.g.*, in sterilising fruits, oilseeds, etc., and for killing weevils in bales of tobacco.



A Vertical Impregnator.

The Meldola Medal

Applications Invited for the 1933 Award

THE Meldola medal (the gift of the Society of Maccabæans) is awarded annually to the chemist whose published chemical work shows the most promise and is brought to the notice of the administrators during the year ending December 31 prior to the award. The recipient must be a British subject not more than thirty years of age at the time of the completion of the work. The medal may not be awarded more than once to the same person. In awarding the medal for 1932, the adjudicators will, unless exceptional circumstances arise, give special consideration to work in physical or inorganic chemistry. The next award will be made in January, 1933. The Council of the Institute of Chemistry would, therefore, be glad to have its attention directed, before December 31, to work of the character indicated. Communications should be addressed to the Registrar of the Institute, 30 Russell Square, London, W.C.1.

Acetate Silk Dry Cleaning Agents

A False Impression Removed

ACETATE silk differing characteristically in chemical and physical properties from all other types of natural or artificial fibres, must be handled with due regard to these special properties, if the goods are not to suffer in either lustre or tensile strength. Contrary to some impressions which still prevail, acetate silk is decidedly resistant toward the action of many common and cheap dry-cleansing agents. According to the "American Dyestuffs Reporter" many of the special dyestuffs now used for the dyeing of acetate silk are also resistant toward such cleansing agents, which was not the case a few years back, when the commoner dyestuffs, in use and satisfactory for other fibres, were giving acetate silk a bad reputation. Gasoline and other liquids of the same type, hydrocarbon mixtures of the paraffin and benzene series—benzene, toluene, xylene, are good, as well as the more common and in many ways more desirable carbon tetrachloride. All such solvents should be used cold. Care must be exercised, however, with some of the solvents which have proved themselves very valuable with other fibres. Acetone, chloroform, tetrachlorethane, etc., attack acetate silk very vigorously, speedily swelling and actually dissolving the fibre, and so hopelessly ruining the weave.

Railway Company's Research

London Midland and Scottish Changes

IN consequence of the retirement of Sir Henry Fowler, assistant to vice-president for research and development, and of Mr. T. H. Adams, chief chemist, early in the new year, the research department of the London Midland and Scottish Railway will from January 1 be under the general supervision of Sir Harold Hartley, vice-president and director of research, and its headquarters will be transferred to Euston.

Mr. T. M. Herbert has been appointed research manager to co-ordinate the research work carried out in external Institutions and in the five sections into which the department will be divided. Dr. P. Lewis-Dale will take charge of the chemical section, and Mr. F. C. Johansen (of the aerodynamics department of the National Physical Laboratory) has been appointed to take charge of the engineering research section. Mr. E. Millington, Mr. W. Pritchard and Mr. F. Fancutt will be responsible respectively for the sections dealing with metallurgy, textiles and paint.

The general research policy of the company is supervised by an advisory committee on scientific research, consisting of a number of distinguished scientists and the company's principal technical officers. The director of research acts as chairman of the advisory committee.

Experience gained during the past two years has indicated the great value of personal contact between members of the research committee and the company's technical staff, and the re-organisation which is about to be made should further assist in facilitating this co-operation, and in co-ordinating the internal and external facilities for research now available to the company.

Letter to the Editor

The British Association of Chemists

SIR,—In your report of the annual meeting of the British Association of Chemists I notice my speech is reported to indicate that the reserve fund is smaller than in the preceding year, whereas it actually shows an increase of £374 11s. 7d. The mistake is probably due to compressing my remarks " that the amount (£374 11s. 7d.) put to reserve this year is smaller than the sum which we were able to put to reserve last year, owing to the large increase in the sum paid out in benefits to members."

The £374 11s. 7d. to reserve is the actual increase due to subscriptions and interest on investments after paying out the largest amount ever paid for benefits, and does not show any increase due to the appreciation of the market value of the securities. The general fund also shows an increase in reserve, after allocating to the special aid fund a portion of the balance on the year. An explanatory note in the balance sheet shows that the securities are quoted at cost, and that whereas in the September, 1931, balance sheet the market value was £433 below the cost, in September, 1932, the market value was approximately £1, 119 above the cost, *i.e.*, an increase of about £1,552. If we take the difference in the market value of the securities instead of the cost value, and add this to the £374 11s. 7d., the reserve funds, instead of being smaller, have been increased by over £1,926 as the general fund also shows an increase. The actual value of these securities will depend on their market value at the time they are sold, and that is the reason why we prefer to keep them " at cost " in the balance sheet.—Yours faithfully,

W. H. WOODCOCK,
Hon. Treasurer,
British Association of Chemists.

175 Piccadilly, London, W.1.

White Pigments in Italy

Notable Increase in Production of Titanium White

STATISTICS relating to the manufacture of white pigments in Italy are recorded in the November issue of the "Journal of the Italian Chamber of Commerce in London." The manufacture of titanium white was started in Italy in 1925. In a few years this product, now made only by one Milanese firm which treats titanium ore with sulphuric acid, has come rapidly to the fore and in 1930 the production rose to 1,400 metric tons. As a pigment it has acquired favour because it is not poisonous and does not deteriorate, and it is now widely used not only by the Italian paint industry, but also in the manufacture of paper, linoleum, celluloid, etc., and in the preparation of cosmetics.

The manufacture of oxide of zinc in Italy dates back to 1906, when the scientific working of the mines at Inglesias (Cagliari) for the zinc ore contained in their blende and calamine and for the lead contained in their argentiferous galena, gave rise to the erection of the first plant for the manufacture of zinc white obtained direct from calamine. Subsequently other important factories were erected to prepare the oxide from metallic zinc and zinc ashes. Seven factories, employing some 200 workers, are now engaged in Italy in the manufacture of zinc white. Most of them are located in the provinces of Genoa, Turin, Milan, Perugia and Cagliari. The total output, which in 1913 amounted to 1,720 metric tons, stood at 4,920 metric tons in 1926, at 4.430 in 1929, and at 4,815 in 1930.

White lead has been made in Italy since 1860. The industry arose and attained its greatest development in the province of Genoa, where in 1880 there were thirteen factories with an annual output of 1,600 metric tons. Of the many processes of manufacture the chamber process and that of precipitation are those used in Italy, the former being preferred for technical reasons.

There are now altogether seven factories engaged in the manufacture of white lead, located in the province of Genoa, Milan, Naples and Cagliari. The total output amounted to 3,420 metric tons in 1926, to 2,913 in 1929, and to 1,870 metric tons in 1930

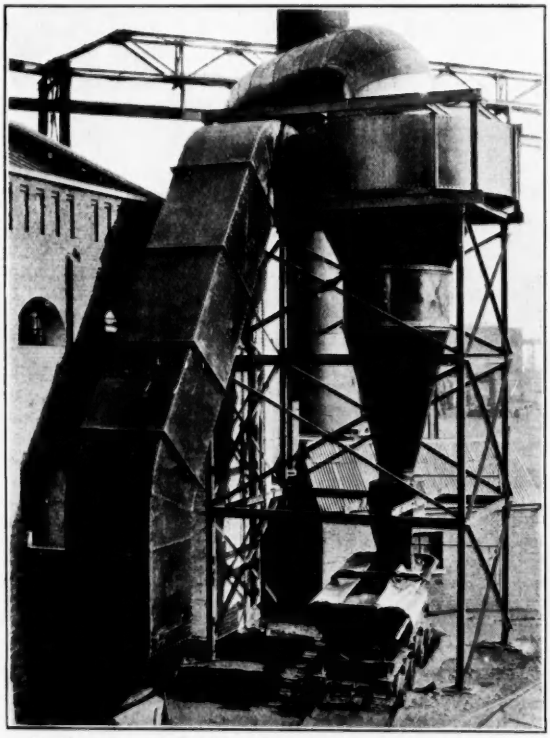
Modern Centrifugal Dust Collectors

Some Notable Chemical Works Installations

THE great advance that has been made during the past few years in the science of dust separating, using patent collectors operated on the centrifugal and gravity principle in conjunction with a fan, is of particular interest to the chemical industry both for general process work and the operation of the boiler and power plant. The main pioneers in this field are Davidson and Co., Ltd., the inventors of the "Sirocco" multi-bladed fan, who a number of years ago perfected their centrifugal dust collectors, after extensive laboratory and large-scale experiments. This firm has now installed over 1,000 collectors in different countries of the world, including about 600 for steam boiler plant, where the problem has been the separation of dust from chimney gases. About 140 different industrial operations are equipped with the collectors, typical applications being associated with asphalt, bakelite, bauxite, bleaching powder, celluloid, cement, chromium sulphate, French chalk, coal screening and pulverising, ore crushing, indigo, ebonite, naphthalene, ferro-molybdenum, gum, lime, linoleum, lead oxide, tarmacadam, mica, peat, pyrites, soap powder, and sawdust.

General Operating Principle

Three general types of "Davidson" collectors are available, namely, "D" (direct), "S.P." (shunt pressure), and "S.S." (shunt suction), but the basic principle in all three is the same. The "D" type, for example, consists of a horizontal casing of volute shape into which dust-laden



Davidson Patent "D" Type Dust Collector applied to Boilers at the Beckton Works of the Gas Light and Coke Co., burning Coke Breeze, 17 tons of dust per week being separated.

gases pass by fan suction and then travel round at high velocity. In this way the heavier dust is thrown to the outer side of the casing by centrifugal force, while because of the volute shape this pronounced separating action gradually increases as the radius of the casing diminishes. From the top the dust-free gases pass out by a trunk leading to the suction of a fan or direct to the atmosphere, whilst the bottom of the volute casing is provided with a large diameter cone, terminating in a dust outlet leading to a closed collector chamber, the separating action on the dust particles being assisted by gravity. It will therefore be seen that the equipment operates without moving parts, high tension electricity, water sprays, or any other complications. If necessary, the collectors can be situated on the discharge side of the fan.

In the chemical industry two typical 24 in. collectors of the "D" type are operating at the works of Joseph Crosfield and Sons, Ltd., Warrington, for dealing with soap powder; four similar "D" type collectors, each dealing with 5,000 cubic feet of air per minute, are installed at the Port Sunlight works of Lever Bros., Ltd. Mention must also be made of a "D" type collector installed at the Manchester (Droylesden) works of the British Dyestuffs Corporation, Ltd., for the collection of glycene powder, whilst another notable installation is at the works of High Speed Alloys, Ltd., Widnes, dealing with ferro-molybdenum dust.

Dust Removed from Combustion Gases

In connection with boiler plant, these collectors are now operating at many of the largest power stations in Great Britain. One of the latest installations is at Ironbridge, near Shrewsbury. This is the first power station in the world to be completely equipped with these collectors in parallel fixed on the suction side of the induced draught fans, solving the extremely serious problem of fan erosion caused by the dust in the chimney gases, due to the very high water gauge suction now being demanded for super-power station operation. This problem of dust separation from combustion gases has hitherto been rendered extremely difficult because of the huge volume concerned, corresponding approximately to 500,000 cubic feet at 250 to 450° F. per ton of coal burnt, while the amount of dust may vary within a range of say 0.25 to 15.0 per cent. by weight of the coal fired. In a large number of cases the figure is within a range of 2.5 to 7.5 per cent. and the collectors will remove 90 to 95 per cent. of the total dust. In many cases several hundred tons per week are being separated, such dust containing quite an appreciable proportion of particles less than 1/50 of a millimetre in size.

A typical boiler plant now operating on these lines is to be found at the works of the British Dyestuffs Corporation, Ltd., where one "S.P." collector is dealing with 94,000 cubic feet of combustion gases per minute at 400° F. At the Beckton works of the Gas Light and Coke Co., where coke breeze is burned on chain grate stokers with mechanical forced draught, there is a "D" type collector separating 17 tons of dust per week. In connection with a battery of six "Lancashire" boilers (each 30 ft. by 9 ft.), a notable installation of "S.P." collectors is operating at the works of Siemens Bros., Ltd., Woolwich, one ton of dust being removed per 10 hour shift.

Efficiency Unaffected by Abnormal Conditions

Apart from the advantages already mentioned, another important point in connection with these collectors is that the efficiency remains the same irrespective of variation in the amount of dust in the gases. Apart from industrial examples that could be mentioned, one of the most striking is the operation of soot blowing in water-tube boiler practice, that is dislodging once or twice per shift all the deposited dust on the tops of the boilers by means of high pressure steam jets. As a result of this practice there is an enormous increase in the normal amount of dust in the chimney gases, which may persist for a period of 15 to 20 minutes, and not return to normal conditions for at least one hour, the average amount of dust during this hour being approximately five times that of normal continuous running. Circumstances of this kind make no difference to the efficiency of the collector, the relatively simple character of which applies equally to general industrial operation as well as to steam boiler plant.

Chemical Notes from Overseas

Lavender Oil in Australia

THE commercial cultivation of lavender in Australia and distillation of the oil is meeting with success, according to unofficial reports. It is further stated that the oil is being exported to this country, where it commands top prices.

Chile to Export Guano

A PERMIT to export 8,000 tons of guano was recently issued by the Chilean Ministry of Agriculture to a firm accorded the right to develop guano deposits off the Chilean coast. The concessionaires estimated total guano available at 23,852 metric tons.

Lithuanian Glue Factory

A NEW glue factory is being established at Kaisiadorys, Lithuania, under the supervision of one of the largest meat packing firms in the country. It is stated that the prospective raw material capacity of the factory will be 1,500,000 tons, from which will be produced fat, glue and fertiliser materials. The factory is utilising the equipment of an old glue factory which formerly operated at Kaunas.

German Superphosphate Sales

SINCE the establishment of a new tariff of 15 marks (15s. at par) per metric ton effective from September 26, an improvement has been observed in the sales of German phosphates. The low output of basic slag by the steel mills was 25 per cent. of the 1929 peak level. This also benfits German superphosphate plants. Manufacturers of superphosphate have estimated that the 1932 sales record will exceed the low 1931 level of 560,000 tons.

Carbon Black in Roumania

IT is reported that a group of foreign capitalists are negotiating with the Roumania Government for a concession to erect a carbon black plant in Roumania. The International Hydrocarbon Corporation proposes to build a plant with an initial daily output of 25 tons, and a potential capacity of 125 tons daily. The new organisation is of the opinion that Roumania, with its rich resources of natural gas in the Transylvanian region is capable of supplying a large share of the European demand for carbon black.

Sugar Cane Wax Production

THE production of wax from the refuse of sugar cane has been discontinued by the sugar milling industries of Natal, due, it is said, to the limited and irregular local and export demand for the product. The secretary of one of the largest sugar milling corporations in Natal, which controls the Natal Cane By-Product, Ltd., plant, having an output of eight tons per week, states, however, that production may be resumed within the next few months. It was stated that the primary product is crude black wax, with a melting point of 67° C. By a chemical process the fats are separated from the crude wax, the resulting products being soft vegetable wax and hard black wax with a melting point of 83° C.

Potassium Iodide Experiments

FEEDING potassium iodide to chickens is said to accelerate the development of the hatching instinct, increase the laying capacity and producing eggs containing 300 to 400 mgms of iodine in readily assimilable form, according to German experimenters. A recent report on the results of prolonged research states that a number of chickens were fed a daily ration of 2 mgms of potassium iodide, which resulted in an average increase in egg production of 3.5 per cent. While the iodine content of ordinary eggs, exclusive of the shell, is from 4 to 7 mgms, the eggs laid by iodine-fed chickens contained as much as 300 to 400 mgms iodine. The content showed, however, considerable variations. The highest figures mentioned were found after feeding potassium iodide for three weeks, during which time the iodine content in the eggs gradually increased. On discontinuing the iodine diet, a gradual decrease of this element in the eggs was observed, which finally sank down to normal. Most of the iodine present in the eggs was concentrated in the yolk, a much lesser amount in the white, and quite an insignificant quantity in the shell.

Proposed Latvian Nitrogen Plant

THE Latvian Ministry of Finance has drawn up a memorial concerning the erection of a nitrogen plant near the Dahlen hydro-electric plant, now in course of construction. The estimated cost of the proposed nitrogen plant is £175,000 at par.

Argentine Animal By-Product Exports

DURING the first nine months of 1932 exports of animal by-prodcts from the Argentine included: Bones, 19,733 metric tons; dried blood, 7,514 tons and guano 23,488. Comparative statistics for nine months of 1931 are 21,660 tons, 8,457 tons and 24,086 tons, respectively.

Tunisian Phosphate Exports

DURING the first eight months of 1932 the total phosphate exports from Tunis were 1,010,000 metric tons, as compared with 1,262,000 in the corresponding months of 1931. Production during June and July of 1932 was somewhat less than exports, but the position was reversed in August. The excess in production over exports totalled 103,000 tons for the first eight months of 1932, as compared with 273,000 tons for the eight-month period of 1931.

Swiss Chemical Firm's Losses

THE well known electro-chemical manufacturing concern, "Lonza Usines Electriques et Chimiques S.A.," at Gampel and Basle, Switzerland, recently announced a net loss for the 1931-32 fiscal year of £112,300 (at par), against 1930-31 profit of £92,030 (at par). The production of carbide and calcium cyanamide was greatly reduced in the various Swiss branch factories; electric power from the company's hydro-electric power plants in the Canton of Valais, Switzerland, could not be used fully. Increased duties abroad and other import restrictions, toegther with an extremely keen competition, seriously handicapped their export business.

Trichlorethylene Consumption in Italy

PRODUCTION of trichlorethylene in Italy was begun in 1926 with an output of 1,900 tons in that year, and during the last four years has ranged as follows: 1929, 3,830 tons; 1930, 3,115; 1931, 2,350 and 1932 (estimated), 2,900 tons. With the development of domestic production imports have practically ceased—only one ton was imported in 1931, and less than half a ton in the first six months of 1932. On the other hand, exports are expanding rapidly, having risen from 1,100 tons in 1930, to 1,450 tons in 1931, and an estimated 1,800 tons in 1932. Domestic consumption in 1932 is estimated at 1,100 tons, as compared with 900 tons in 1931.

White Lead for the Argentine

WHILE Great Britain is the leading country for white lead imports into Argentina, the share of the trade by Belgium and Germany has been advancing since 1929. Import statistics of white lead into Argentina for 1931 disclose a total quantity of 1,203 metric tons, Great Britain supplying 719 metric tons, which was 186 tons less than in 1930. Belgium sent 222 metric tons, or a gain of 107 metric tons over the previous year. The share of Germany was 224 metric tons, an increase of 139 metric tons in contrast to 1930. Imports of the pigment from the United States declined from 115 metric tons in 1930 to 26 metric tons during 1931.

Gum Arabic Situation in Egypt

THE Egyptian gum trade is said to be faced with one of the most difficult situations ever experienced, stocks on hand totalling 13,000 tons in mid-October, according to dealers, and an estimated carry-over to next year of 10,000 tons. Exports during the first eight months of 1932 amounted to 111 tons for the bleached gum and 11,397 for Kordofan or Hashab arabic, a decrease of 63 tons for the bleached and 3,036 tons for Hashab gum from the corresponding 1931 period. The trade in Talh gun, the least expensive grade, experienced an improvement in August with a reduction in freight rates and royalty. Exports during January-August, 1932, increased to 766 tons from 470 tons in the similar period of 1931.

British Celanese, Ltd., v. Courtaulds, Ltd.

Artificial Silk Patents—Evidence for the Defence

IN the Chancery Division on December 1, the hearing was resumed of the action by British Celanese, Ltd., against Courtaulds, Ltd., alleging infringement of three letters patent for evaporative or dry spinning of cellulose acetate artificial silk. The infringement was denied and revocation of the patents asked for on the ground of invalidity.

Sir Arthur Colefax, K.C., Mr. Craig Henderson, K.C., and Mr. E. J. Neep appeared for the plaintiffs, and Mr. J. Whitehead, K.C., Sir Stafford Cripps, K.C., Mr. Trevor Watson, K.C., and Mr. G. W. Tookey, for the defendants. Mr. L. F. Heald held a watching brief for the Cellulose Silk Co., Ltd.

At the opening on Thursday, his lordship said he was alarmed at the length of the case and proposed to sit on Saturday.

Mr. Whitehead said the defendants' evidence would probably last from seven to eight days and in view of the magnitude of the case he did not think it would be safe to allow less than five days for the speeches by counsel. That would leave extraordinarily little margin before the Christmas vacation.

Mr. Hubert Alexander Gill, chartered patent agent and consulting engineer, gave evidence for the defendants as to the methods of spinning and twisting textile fabrics. Prior to the war, he said, there were three processes in use for the manufacture of artificial silk—viscose, nitro-silk and cuprammonia. The viscose process was the most predominant in this country.

Direction of the Spinning

Sir Stafford Cripps then proceeded to take the witness through the plaintiffs' specification, and asked Mr. Gill if the provisional specification indicated to him as an engineer that outside spinning there spoken of was merely applicable to any particular direction of spinning.

Witness answered in the negative.

Sir Stafford: In the absence of any special direction in a process of this sort as to where the winding mechanism was to be put, would you as a matter of course place the mechanism inside or outside?—Outside. It follows from the common knowledge of all operations in the textile industry and it is universal to put it so that it can be convenient to the operator.

There might be some reason for doing otherwise?—Yes, to recover the solvent still remaining on the material.

If anyone wanted to get complete evaporation of solvent of the dope within the casing was there any means for doing it?—No. That would be obvious.

And the physical law which governs the speed of evaporation would then be well known?—Perfectly.

Supposing it had been desirable in a particular case to dry the filaments within the casing, where would you say was the natural and obvious place to put the mechanism to dry this filament?—Outside the casing.

These questions I am putting to you are prior to March, 1920?—Certainly. Many of the matters were known prior to the date of that document.

Sir Arthur Colefax objected to these questions being raised on the provisional patent.

Mr. Whitehead argued that the objection should be overruled as according to decided cases such examination was allowed.

His lordship over-ruled the objection and thought it was material that he should look at the provisional specification. He thought the questions were proper questions and that he was entitled to pay attention to them.

Dealing with the complete specification, Sir Stafford asked if the word "volatile" conveyed anything particular to witness's mind.—Mr. Gill said it depended on the temperature at which one was working and it was a matter of common knowledge to chemists that those which evaporated easily were volatile and if working at high speed other liquids might become volatile.

Replying to other questions, witness asserted that it was impossible to wind with a false twist. The only conceivable way of doing it was to reverse as Mr. Swinburne had spoken about. But it was not used and was no use.

Witness said cap spinning was extensively used in the worsted factories, in fact the whole output was run by cap spinning. The flier was also used. Rotation of the cap in his opinion helped matters.

After dealing with the question of evaporating the solvent and drying the filaments, Mr. Gill said that many of the matters in the specification were known prior to the date of that document.

Cross-examined by Sir Arthur Colefax, witness said he had no knowledge of viscose before 1922, but he was acquainted with nitro. He was not a chemist though he had knowledge of chemistry, but in his opinion the liquid in the bath did not change in its concentration. There might be some variation but it would be so slight that it would not make any perceptible difference. He agreed that it was all important to maintain uniformity in the box which fed the jets.

Sir Arthur next dealt with the patent of 1926 which related to dry spinning for the production of artificial silk by nitro or acetate.

Witness agreed that silk produced by the process would vary. The patent he also agreed concerned the keeping of centration the same. With regard to lustre he had no doubt that different effects were obtained by different cross sections.

Dealing with prior knowledge, Mr. Gill said with regard to the control and variation, that he took the view that control and variation were definitely dealt with in prior specifications. They did not refer to control or variation of temperature in his view.

Sir Arthur: In the process used by the plaintiffs and defendants, is the possible rate of spinning considerably higher than that obtaining in the nitro industry?—Witness: Yes.

That was a matter of obvious and considerable economic importance in the particular industry in which the process is employed?—Yes.

The process I am suggesting is the one which is the subject of the plaintiffs' first patent?—Witness said he was assuming counsel meant the process which it was alleged defendants had infringed.

A Question of Speed

Sir Arthur: Not only has the process got this possibility of greater speed but it has the possibility of producing a better product? I am not referring to the fact that it is used for cellulose acetate as contrasted with nitro cellulose, but I suggest it is a process which has this potentiality, the possibility of a better product.

Mr. Gill: I find it very difficult to answer that because it is only used as far as I know for a material which had never been dry spun to my knowledge before 1920. One can hardly call that a better product because it was not an existing product to any extent.

Without the third patent where you have cap spinning of the process which is the subject of the first patent, you have a product the uniformity and quality of which impressed the persons acquainted with the standards obtaining in the nitro-silk industry?—That I cannot say.

Witness agreed that the process had advantages over the nitro silk process where the material had to go through further stages of manufacture, but said that was really the advantage of the acetate and not of the process. It was the best process he knew for dealing with acetate, but as to nitro silk he did not know enough of the possibilities to express an opinion.

Asked whether the process had not considerable advantages as applied to nitro silk over existing processes, Mr. Gill replied in the negative, but added that if it could be worked as described it was undoubtedly quicker. Whether it was a commercial process for nitro silk he did not know.

Answering further questions, Mr. Gill contended that the use of cap spinning in the industry was an obvious one.

Continuing his cross-examination, Sir Arthur put to Mr. Gill questions directed to the process of twisting.

Witness admitted that in the flyer process, it was the rotation of the flyer which put in the twist before the yarn

reached the bobbin. In cap spinning the rotation of the bobbin was essential to the twisting.

Sir Arthur put it to Mr. Gill that plaintiffs' patent provided for winding and twisting simultaneously by cap spinning.

Witness agreed that cap spinning could be done up to 11,000 revolutions a minute, and if plaintiffs lowered the speed they could put in more twisting. He admitted that cap spinning had many advantages.

False and Permanent Twist

Questioned as to the meaning of a false twist in worsted Mr. Gill declared that a false twist did not put in a permanent twist, and that was why it was called a false twist.

Sir Arthur: I put it to you that a false twist means no twist at all?

Mr. Gill: A false twist is not a permanent twist.

Sir Arthur: That is not accepted.

Counsel then asked whether in the prior documents on which the defendants relied there was any suggestion of simultaneous winding and twisting except in two of the specifications.

Witness: As applied to artificial silk.

And in both these cases it was a case of wet spinning?

Witness replied that in one case it was a wet product which was wound, but in the other it was dried first.

Dealing with the question of downward and upward spinning, Mr. Gill said the obvious thing would be to spin downwards but a person spinning upwards would want to find his advantage before he adopted that method.

On Monday and Tuesday the hearing was continued, and Mr. Gill's cross-examination by Sir Arthur Colefax, K.C., for the plaintiffs, was resumed.

Mr. Gill stated that the flyer, ring and cap were the three devices regularly used in the textile industry, for spinning and winding simultaneously.

Professor Ernst Berl, Doctor of Philosophy of Zurich and professor at Dammstradt University, said he had knowledge of the manufacture of nitro-cellulose silk at Tubize in Belgium and in the United States, having visited the works in those countries many times between 1926-28. At Tubize nitro-cellulose silk was being manufactured and they were spinning an enclosure in order to recover the solvents.

In witness's opinion the specification of one of plaintiffs' patents, reproduced exactly what was done at Tubize.

Mr. Whitehead: Did the casing alter the machinery itself?—Witness: No.

Or any alteration in the winding machinery?—Witness: No. Witness added that the process was a dry spinning process. They spun at from 50 to 60 metres a minute. They could have spun faster if it had not been for the oscillation of the jumping bobbins. The reason they did not remedy this was chiefly questions of capital. Irrigation of the bobbins was carried out by means of water.

Dangers in Drying

Mr. Whitehead: Would there be any danger if one completely dried the nitro-cellulose threads?—It would be very dangerous.

Why?—Because dry nitro-cellulose filaments are explosive substances.

In making the casing did you alter the winding apparatus?—No.

At what date did this change begin?—In 1912.

Witness added that subsequently they manufactured viscose silk at Tubize.

On Wednesday, Professor Berl continued his evidence.

Mr. Whitehead: Is de-nitration an important part of the process?—Of extreme importance.

Were you able to improve the de-nitration at Tubize?—I altered it in its very principle.

Whilst at Tubize were you concerned in attempts to recover the nitric acid?—I noticed that as a new thing.

In order to manufacture nitro-cellulose silk you used ether alcohol as solvent?—Yes.

Did you carry out work with a view to using acetone as the solvent?—I carried out research work in that respect.

Did these matters keep you fully occupied all the time?—Yes.

In the spinning of nitro silk was there any breakage?—At first very much, but later to a less extent.

Questioned with regard to spinning, the witness said there were a large number of advantages in favour of upward spinning at Tubize.

Witness said he had tried downward spinning but in the case of thick viscous solution he would spin either upwards or downwards. With a thin solution from a single jet he would spin downwards. It was not possible to spin a thin solution upwards with sufficient speed.

Sir Arthur Colefax cross-examined. Witness said he was head of the scientific research department at Tubize and continued so till the outbreak of the war. Whilst he was there endeavours were made to improve the process then in use.

A German Patent

Sir Arthur: Have you not since 1920 become the patentee of a process of dry spinning downwards?—Yes, I took out a German patent in 1928.

For the recovery of solvent by activated carbon have you not a patent process?—Yes.

And did you not propose that process to Hopewell?—I proposed it, but I found it was instituted by an American firm.

Answering further questions, witness said he agreed that in the nitro-cellulose there was water, from 20 to 25 per cent. Water was not present in chemical combination.

Sir Arthur challenged that when Professor Berl said "That is a scientific fact and cannot be disputed."

The hearing is proceeding.

Key Industry Duties

Continued Exemption of Chemical Products

An Order has been made by the Treasury under Section 10 (5) of the Finance Act, 1926, continuing the exemption from duty imposed under the Safeguarding of Industries Act, 1921, as amended by the Finance Act, 1926, of the following chemical products until December 31, 1933:—

Acid adipinic; acid isobutyl allyl barbituric; acid oxalic; acid propionic; amidopyrin (pyramidon; dimethylamidoantipyrine); ammonium perchlorate; barbitone (veronal; malonal; malourea; acid diethyl barbituric; diethylmalonylurea; hypnogen; deba); bromural (dormigene); butyl methyl adipate; calcium gluconate (calcium glyconate); celtium oxide; chinoline (quinoline); chinosol; cocaine, crude; dial (acid diallyl barbituric); dicyandiamide; didial (ethyl morphine diallyl barbiturate); dimethyl sulphate; diphenyl; diphenyl oxide; dysprosium oxide; elbon (cinnamoyl para oxyphenyl urea); erbium oxide; ethyl abietate; ethylene bromide; eukodal; europium oxide; furfurol; gadolinium oxide; germanium oxide; glycol ethers; guaiacol carbonate (duotal); holmium oxide; integrators (planimeter type); R. lead acetate; lead tetraethyl; lipoiodin; lutecium oxide; mercury vapour rectifiers having mercury cathodes; metaldehyde; methyl cyclohexanol methyl adipate; methyl sulphonal (diethylsulphonemethylethylmethane; trional); methylene chloride; neodymium oxide; nickel hydroxide; oxymethyl para-oxyphenyl benzylamine methyl sulphate; papaverine; phenazone (antipyrine; phenyl dimethylpyrazolone; analgesin; anodynine; dimethyl oxychinizin); phenetidine, para-; phloroglucine; photogravure screen (both rulings on one plate) exceeding 40 inches in length; phytin; piperazine (diethylenediamine; dispermin); planimeters; R. potassium chlorate; potassium ethylxanthogenate (potassium xanthogenate); potassium guaiacol sulphonate (thiocol); R. potassium hydroxide (R. potassium caustic; R. potassium hydrate); R. potassium permanganate; praseodymium oxide; pyramidon-veronal; quinine ethyl-carbonate; radium compounds; salol (phenyl salicylate); samarium oxide; scandium compounds; sodium ethyl methyl butyl barbiturate; strontium carbonate; strontium nitrate; styracol (guaiacol cinnamate); sulphonal; synthalin; terbium oxide; thulium oxide; urea (carbamide); vanadium-silica compounds specially prepared for use as catalysts for sulphuric acid manufacture; ytterbium oxide; yttrium oxide.

The exemptions on hydroquinone, phenacetin (acetparaphenetidine) and resorcine ,resorcinol) which existed until December 31, 1932, it should be noted, have not been renewed.

The Treasury Order will shortly be published by the Stationery Office.

News from the Allied Industries

Whale Oil

THE WHOLE OF THE 1932-1933 SEASON'S production of whale oil has been purchased by Unilever, Ltd. The deal is estimated at seventy million Norwegian kroner, or over £3,500,000 at the present rate of exchange.

Glassware

SPEAKING AT A LUNCHEON given at the Savoy Hotel, London, on December 6, Sir Max Bonn announced an important new development in the British glass industry. This is the introduction of mass production methods in the manufacture of cheap glass table glassware, a department of the trade in which our foreign competitors, notably Czecho-Slovakia, have for long enjoyed practically a monopoly in the British market. The change in British fiscal policy is stated to have made possible this development in which large capital sums have been invested and which is already bearing fruit.

Non-Ferrous Metals

DEVELOPMENTS AT THE COPPER CONFERENCE are well guarded, but it is understood that Roan Antelope is presenting the major difficulty owing to its demand that its 1933 output quota should be raised from 23,379 to 41,600 tons, after other producers had signified their willingness to adhere to this year's quota. In a statement made before sailing for New York, M. Cattier, president of Union Minière, threatened to increase the copper output of Union Minière unless a quick decision was reached by the Copper Conference to continue the old quotas. He said that the chances of reaching a settlement were very small indeed.

Sugar

QUESTIONS LEFT OVER from the Ostend Conference of last July, particularly that of the liquidation of surplus stocks and Cuba's request for an increase in her export quota, have been settled at the International Sugar Council at the Hague. It is understood that the settlement with Cuba provides that her export quota for 1934 and 1935 shall be increased by 70,000 tons, to be offset by a reduction in the German quota. Following the Conference a resolution was voted stating that the meeting had been a complete success, agreement having been reached regarding the Ostend decisions. Efforts are to be made to eliminate systematically additional surplus stocks accumulated in various countries, and their existence will be borne in mind at the sowing and planting of next year's crop. The next meeting of the Council will take place in Paris on March 13, 1933.

Matches

THE NEW BOARD of the Swedish Match Co. includes four foreign members, of whom two, Walter Carter and George Sambert, are associated with British insurance interests. The other two are M. Eugene Regard (honorary governor of the Credit Foncier in Paris) and M. Rodolphe Speich (general manager of the Swiss Bank Corporation in Bâle). Mr. Fred Ljunberg, who has been appointed managing director, was previously managing director of Trummer and Co. in London, or many years distributors of Swedish matches on the British market. The company's share capital under the reconstruction scheme has been reduced from 300,000,000 to 90,000,000 kroner. This reduced amount has been fixed against the commercial value of the foreign monopolies, which, with minor exceptions, still hold good. All important creditors have agreed to the plan of reconstruction, under which they will receive 6 per cent. interest and gradual amortisation of their claims. An interesting decision of the company, which awaits confirmation by the shareholders, is to remove the headquarters of the concern to Joenkoeping, in the province of Smaland, where safety matches were first invented and the principal factories are located. The cost of removal will be partly defrayed by the town of Joenkoeping.

THE TURNOVER of the German Match Monopoly Co. in the current year has reached the estimate. The net profit is expected to be about the same as in the previous year, when a dividend of 8 per cent. was paid. The factories are working 65 per cent. of the capacity, and working time has been reduced to five days weekly.

Paint and Varnish

INCREASED PROFITS and a return to dividends are features of the report of Lewis Berger and Sons, Ltd., the paint and varnish manufacturers. The net profit, at £57,322, compares with £30,978 in the previous year, and an ordinary dividend of 5 per cent. is proposed. The previous payment was 10 per cent. in 1929-30. The balance sheet shows an improved position. The loan of £50,270 has been paid off, and while cash is down from £64,606 to £5,577, British Government securities to an amount of £102,614 have been acquired.

Safety Glass

SPLINTEX SAFETY GLASS, LTD., has not had a very fortunate career financially, but its balance sheet this year gives some grounds for hope. The reduction of capital has cleared it of most of the bad assets (other than the year's loss of £22,578, which has intruded itself despite the hopes of a completely clean balance sheet after the financial reconstruction), but, more important than that, the company has been able to dispose of its Wimbledon factory for £51,000, out of which all but £4,500 of the mortgage has been paid off, while cash is raised to the reasonable figure of £13,546. Meanwhile, the acquisition of the Newtex business for £16,000 in preference shares provides a factory and another works at Hanwell is being leased on what are said to be favourable terms.

Low Temperature Carbonisation

LOW TEMPERATURE CARBONISATION, LTD., in their report for the year ended October 31 last, shows that trading profit at Barugh Works was £39,079. Investments in Doncaster Coalite, Ltd., produced £9,167, and sundry revenue, with the trading profit, produced a total of £49,828. All-in expenses for the year were £13,990, and after adding directors' fees of £2,800, a credit balance remains of £33,038. Out of this there is provided £12,000 to pay debenture interest, £5,899 depreciation, leaving to be carried to the credit of profit and loss account £15,138. The interest paid on the debentures is equivalent to a dividend of 12 per cent. per annum on the capital invested in the works and oil distillery at Barugh. These manufacturing profits do not include any profit on the smokeless fuel, oil and petrol made at the Askern Works of the subsidiary company, Doncaster Coalite, Ltd. Cash in bank has increased to £37,369.

Mineral Oil

THE NOMINAL CAPITAL of the Iraq Petroleum Co. has been increased by the addition of £700,000 in £1 ordinary shares beyond the registered capital of £5,100,000. This new money is probably required in connection with the pipeline which the company is constructing from the field to the Mediterranean, a distance of 1,200 miles. International in character, the capital is owned as to 23¾ per cent. each by the Royal Dutch-Shell group, the Anglo-Persion Oil Co., a French group and an American group, while Mr. C. S. Gulbenkian owns a 5 per cent. interest.

Superphosphates in Denmark

THE sole Danish producer of superphosphates, Dansk Svovlsyreog Superphosphatfabrik Akts, is reported to have an annual plant capacity of about 350,000 metric tons of superphosphate, with an actual output for the year ended June, 1932, of about 250,000 tons. The Danish consumption for the last fertiliser year was estimated at 331,000 metric tons, which includes approximately 88,000 tons of imports. The 1929 consumption is placed at 425,000 tons and that for 1930 at 400,000 tons. The large proportion of imports was said to be due to the fact that Danish Co-operatives have considered it advisable in the past to purchase a substantial share of their requirements from Germany and the Netherlands because of the desire for trade reciprocity. The decline in superphosphate consumption has been accompanied by a corresponding decline in consumption of nitrogen and potash.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

MARKETS generally continue exceedingly firm, especially in view of the exchange position. The improved demand has been maintained. The coal tar products market remains unchanged from last week. Business in chemicals on the Manchester market during the past week has continued on a relatively moderate scale, with bookings for near deliveries forming the bulk of the trade. Holders of imported materials in many cases are not very anxious sellers at the moment. The price tendency in relation to many of these products is distinctly firm and higher rates seem to be looked for. There is little sign of easiness, however, in any section of the market. In Scotland numerous inquiries for home consumption are being received; also tenders for contract requirements for 1933. There are no important price changes to report in Scotland. With the following exceptions, the prices of chemical products remain as reported in THE CHEMICAL AGE of November 26 and December 3.

General Chemicals

ACID, CITRIC.—LONDON: 10d., less 5%. MANCHESTER: 10¼d.

ACID, OXALIC.—LONDON: £50 per ton in casks, 53s. 6d. to 57s. 6d. per cwt. in kegs. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £50 to £52 ex store.

ACID, TARTARIC.—10⅞d. per lb. SCOTLAND: B.P. crystals, 10½d., carriage paid. MANCHESTER: 10½d.

ARSENIC.—LONDON: £22 10s. c.i.f. main U.K. ports for imported material; Cornish, nominal, £23 f.o.r. mines. SCOTLAND: White powdered £27 ex wharf; spot, £27 10s. ex store. MANCHESTER: White powdered Cornish, £24 10s. at mines.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London, packages free.

LEAD, ACETATE.—LONDON: White, £34 per ton. Brown, £1 per ton less. SCOTLAND: White Crystals, £34 to £36 c.i.f. U.K. ports. Brown, £1 per ton less. MANCHESTER: White, £33; Brown, £30 to £31.

LEAD, NITRATE.—£28 per ton.

NICKEL AMMONIUM SULPHATE.—£56 per ton d/d.

NICKEL SULPHATE.—£56 per ton d/d.

PHENOL.—The market is very firm, largely owing to steady demand and short supply. Figures quoted are, therefore, nominal only, and large quantities, if available, would not be offered under about 8d., with small lots up to 10d. per lb. or more.

SODIUM PHOSPHATE.—£13 per ton.

SULPHATE OF COPPER.—MANCHESTER: £16 10s. per ton f.o.b.

Pharmaceutical and Fine Chemicals

ACID, SALICYLIC.—Technical, 1s. to 1s. 2d. per lb.; B.P., 1s. 7d. to 1s. 10d. LONDON: B.P., 1s. 7d. to 2s. 2d.

AMIDOPYRIN.—10s. 6d. per lb.

BISMUTH.—Carbonate, 7s. 1d. per lb.; citrate, 9s. 7d.; nitrate (cryst.), 4s. 9d.; oxide, 10s. 11d.; salicylate, 7s. 11d.; subchlorate, 10s. 8d.; subgallate, 7s. 7d.; subnitrate, 6s. 1d.

IODOFORM, B.P. CRYSTALS.—17s. 9d. to 22s. 9d. per lb. LONDON: 18s. 9d. to 22s. 9d.

LITHIUM CARBONATE, B.P. 1914.—5s. 4d. per lb.

MENTHOL, A.B.R., RECRYST., B.P.—18s. 6d. per lb.

SODIUM SALICYLATE.—Powder, 2s. to 2s. 8d. per lb.; crystal, 2s. 1d. to 2s. 9d.

SULPHITE ANHYDROUS.—£23 to £25 per ton.

QUININE SULPHATE.—2s. 7d. per oz.

COUMARIN.—14s. 6d. per lb.

GERANIOL.—6s. 6d. to 11s. per lb.

Essential Oils

BERGAMOT.—11s. per lb.

CANANGA, JAVA.—10s. per lb.

CITRONELLA OIL.—Java, 3s. 3d. per lb.; Ceylon, 2s. 6d. per lb.

LEMONGRASS.—3s. per lb.

ORANGE, SWEET.—7s. per lb.

PEPPERMINT, WAYNE COUNTY.—14s. 6d. per lb.

Coal Tar Products

ACID, CARBOLIC (CRYSTALS).—6½d. to 10d. per lb. Crude, 60's, 2% water, 2s. 5d. MANCHESTER: Crystals, 8¾d.; crude, 2s. 2d. SCOTLAND: Sixties, 1s. 7d. to 1s. 8d.

ANTHRACENE OIL.—Strained, 4¾d. per gal.

NAPHTHA.—Solvent, 90/160, 1s. 4d. to 1s. 6d. per gal.; 95/160, 1s. 8d.; 90/190, 1s. 1d. to 1s. 2d. LONDON: Solvent, 1s. 3½d. to 1s 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160, 1s. 3d. to 1s. 3½d.; 90/190, 11d. to 1s. 2d.

PITCH.—Medium soft, £4 17s. 6d. to £5 per ton. MANCHESTER: £4 15s. to £5 f.o.b. LONDON: £4 14s. to £4 16s. 6d. f.o.b. East Coast port.

REFINED COAL TAR.—SCOTLAND: 4¾d. to 5s. per gal.

XYLOL.—1s. 10d. to 2s. per gal.; Pure, 1s. 11d. to 2s. 2d.

TOLUOL, 90%.—1s. 10d. to 2s. 4d. per gal.; Pure, 2s. 3d. to 2s. 8d. per gal.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 10s. to £8 15s. per ton. Grey £10 10s. to £12. Liquor, brown, 30° Tw., 6d. per gal. MANCHESTER: Brown, £9; grey, £12 10s.

ACETIC, ACID, TECHNICAL, 40%.—£16 10s. to £18 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—The export market remains firm and the price for neutral quality, basis 20.6 per cent. nitrogen is £5 7s. 6d. per ton f.o.b. U.K. port in single bags for December shipment. For January shipment the price is £5 10s. There has been no change in home prices.

NITRATE OF SODA.—Prices remain unchanged at £8 12s. for December and £8 14s. for January, delivered to farmers' nearest stations in 6-ton lots.

NITRO-CHALK.—Price remains unchanged at £7 5s. per ton for delivery up to June 30, 1933, in 6-ton lots to farmers' nearest stations.

United Indigo Chemical Co.

Reduction of Capital

IN the Chancery Court at Manchester, on December 5, the United Indigo and Chemical Co., Ltd., 13 Chapel Walks, Manchester, asked the Vice-Chancellor, Sir Courthope Wilson, K.C., to confirm a reduction of capital from £300,000 to £205,000, involving a return of £95,000 to the shareholders.

Mr. C. E. R. Abbott, instructed by Messrs. Addleshaw, Sons, and Latham, appeared for the company. He said it was incorporated in 1899, with a capital of £250,000, afterwards reduced to £95,000, and then, in April, 1920, increased to £300,000 in 240,000 preference shares of 12s. 6d. each and 900,000 ordinary shares of 3s. 4d. each. Owing to the depressed state of trade and of market values generally, the company could not employ all its paid-up capital in the conduct of its business, and it had more than £160,000 invested or available as cash in hand and at its bankers. On June 30, 1932, the date of the last balance sheet, the liabilities to creditors were approximately £9,275. It was proposed to repay 5s. per share to the holders of the 240,000 preference shares and write those shares down to 7s. 6d.; to repay 1s. 4d. per share to the holders of the 525,000 issued ordinary shares and write those shares down to 2s.; to convert the 375,000 unissued ordinary shares into 625,000 ordinary shares of 2s. each; and upon the reduction taking effect to increase the capital to £300,000 by creating 950,000 ordinary shares of 2s. each.

The Vice Chancellor made the order asked for.

Sulphur Interests in Litigation

Defendant Company to Wind Up

IN the Chancery Division on December 6, before Mr. Justice Maugham, a settlement was announced in the action brought by Sir William Alexander and the Barter Trading Corporation against the New Zealand Sulphur Co., Ltd., for rescission of an agreement to subscribe for 45,000 £1 preference and over 188,000 1s. ordinary shares in the defendant company, rectification of the register of members by the removal of the plaintiffs' names, and an injunction restraining the company from attempting to enforce a further call of 5s. on the preference shares.

The action was based on alleged misrepresentations in a prospectus proof as to the quantity of workable sulphur existing on White Island, in the Bay of Plenty, owned by White Island Products, Ltd., in which the defendant company held a controlling interest. The allegations were denied by the defendant company, who also pleaded laches and delay on the part of the plaintiffs and counterclaimed for the amount of the call.

Sir Patrick Hastings (for the plaintiffs) said that it had been agreed that the defendant company should immediately go into voluntary liquidation, and that the action should be dismissed without costs and that the counterclaim should succeed without costs. The company would not take any steps to enforce calls until after the vote on the proposed liquidation had been taken.

Mr. Justice Maugham said he thought, in the interests of the shareholders as a whole, the course indicated was beneficial to them.

Inventions in the Chemical Industry

Specifications Accepted with Dates of Application

PROCESS FOR THE MANUFACTURE OF AZO-DYESTUFFS. A. Carpmael (*I. G. Farbenindustrie*). June 1, 1931. 383,967.

MANUFACTURE OF AMMONIUM MAGNESIUM PHOSPHATE FERTILISERS. E. Urbain. Dec. 2, 1930. 383,997.

MANUFACTURE OF DYEINGS. Soc. of Chemical Industry in Basle. Sept. 3, 1930. 383,998.

PROCESS FOR CRACKING HYDROCARBONS. Vereinigte Stahlwerke Akt.-Ges. Oct. 23, 1930. 384,016.

OXYCHLORIDE CEMENT COMPOSITIONS. M. Cervello. Oct. 24, 1931. 384,043.

PROCESSES OF AND PLANTS FOR BURNING CEMENT, LIME, AND LIKE MATERIALS. H. A. Gill (*F. L. Smidth and Co. Aktieselskab*). Nov. 16, 1931. 384,060.

ALCOHOLIC SOLUTIONS USED FOR ENGINE-COOLING SYSTEMS AND FOR LIKE CLOSED INSULATING SYSTEMS. Carbide and Carbon Chemicals Corporation. Jan. 6, 1931. 384,089.

CARBONISATION OF SOLID COMBUSTIBLES BY INTERNAL HEATING. D. De Nagy. Dec. 15, 1931. 384,092.

MANUFACTURE OF BLACK TRIAZO-DYESTUFFS. J. R. Geigy Akt.-Ges. Jan. 16, 1931. 384,111.

BATH VAT FOR THE SPINNING OR SUBSEQUENT LIQUID TREATMENT OF ARTIFICIAL SILK AND THE LIKE. E. Wurtz. Feb. 15, 1932. 384,133.

MANUFACTURE OF DISINFECTING, ANTI-PARASITIC, AND INSECTICIDAL AGENTS. *Soc. Anon. Des Mines* D'Orbagnoux. June 13, 1931. 384,151.

MANUFACTURE OF NON-SPLINTERING GLASS. Consortium für Elecktro-Chemische Industrie Ges. March 25, 1931. 384,153.

PROCESS FOR THE MANUFACTURE OF ALIPHATIC HALOGENATED ALCOHOLS. I. G. Farbenindustrie. March 21, 1931. 384,156.

DISTILLATION OF COAL AT LOW TEMPERATURE. C. Françoise. April 23. 1932. 384,171.

PROCESS AND APPARATUS FOR THE DISTILLATION OF COAL AT A LOW TEMPERATURE. C. François. April 23, 1932. 384,172.

PROCESS AND APPARATUS FOR THE MANUFACTURE OF METAL CATALYSTS. Schering-Kahlbaum A.-G. May 5, 1931. 384,175.

PROCESS FOR THE MANUFACTURE OF STABLE BARBITURIC ACID COMPOUNDS. I. G. Farbenindustrie. April 29, 1931. 384,176.

PROCESS FOR PRODUCING TEA ENTIRELY OR ALMOST ENTIRELY FREE FROM THEINE. Dr. T. Grethe. June 3, 1931. 384,197.

PRODUCTION OF COLLOIDAL SOLUTIONS OF METAL IODIDES. V. Klopfer. June 20, 1932. 384,217.

MANUFACTURE AND PRODUCTION OF DELUSTRED RAYON. Viscose Co. Dec. 5, 1931. 384,224.

PRODUCTION OF SULPHURIC ACID ESTERS OF GLUCOSIDES. H. T. Bohme A.-G. July 13, 1931. 384,230.

PROCESS FOR THE MANUFACTURE OF CORES OF COMPRESSED MAGNETISABLE POWDER. Siemens and Halske A.-G. July 13, 1931. 384,235.

PRODUCTION OF ALLOYS OF BERYLLIUM WITH HEAVY METALS. I. G. Farbenindustrie. Sept. 5, 1931. 384,243.

TREATMENT OF SILK FIBROIN FOR MAKING AQUEOUS SOLUTIONS THEREOF. I. G. Farbenindustrie. July 31, 1931. 384,247.

Applications for Patents

MANUFACTURE OF AZO-DYESTUFFS, ETC. A. Carpmael (*I. G. Farbenindustrie*). Nov. 28. (June 11, '31.) 33677.

MANUFACTURE OF DYESTUFFS OF THE ONAZINE SERIES. A. Carpmael (*I. G. Farbenindustrie*). Nov. 29. 33798.

MANUFACTURE OF SULPHUR DYESTUFFS. A. Carpmael (*I. G. Farbenindustrie*). Nov. 29. 33799.

MANUFACTURE OF MERCURY COMPOUNDS. A. Carpmael (*I. G. Farbenindustrie*). Dec. 2. 34198.

AZO DYESTUFFS. S. Coffey, Imperial Chamical Industries, Ltd., M. Lapworth and W. A. Sexton. Nov. 30. 33930

ACTIVE CARBON. Compagnie Française de Produits Organo-Chemiques. Nov. 29. (France, Dec. 4, '31.) 33778.

ACTIVE CARBON. Compagnie Française de Produits Organo-Chemiques. Nov. 29. (France, May 20.) 33779 (Cognate with 33778).

PREVENTION OF DISCOLOURATION IN ORGANIC LIQUIDS. E. I. Du Pont de Nemours and Co., and Imperial Chemical Industries, Ltd. Dec. 1. 34053.

PRODUCTION OF HYDRAZINE. G. B. Ellis and E. Merck. Dec. 3. 34309.

Tate and Lyle, Ltd.

Comments on Beet Sugar Competition

IN the course of his address at the thirteenth annual general meeting of Tate and Lyle, Ltd., held on December 6, Sir Ernest Tate, the president of the company, said that sales of refined sugar had been fuly maintained, and they had continued their policy of selling on a small margin, so that the retail price to the public had been kept as low as possible. The actual profit which they had made, worked out at less than one-twelfth of a penny per pound; by contrast home-grown beet sugar is receiving 1¼d. per pound assistance from the taxpayer. As in the past few years, the company's chief competitors have been the home grown beet sugar factories, who make white sugar under a subsidy. The bulk of this white sugar is produced and comes on to the market within a few months and causes unnecessary cutting and depression in prices. If a proportion of this sugar was turned out in the raw form, the full market value could be obtained with corresponding advantages to the British beet sugar factories and to the British sugar refiners. As it is, there is much wasteful competition, white sugar from the beet factories being sent long distances into areas naturally served by the refineries, and the British refiners having to retaliate in a similar manner by sending their products into the areas which should naturally be served by the beet factories.

The British Sugar (Subsidy) Act, 1925, Sir Ernest pointed out, will expire on September 30, 1934. He ventured once more to express the hope that any fresh assistance, if it is given, will carry out the original intention of the Subsidy Act, that is to say, the intention of helping agriculture, and not of giving artificial assistance to factories to produce an article, *i.e.*, refined sugar, which is already being produced by an old-established industry which is capable of producing economically the whole of this country's requirements. "There is nothing we should like better," Sir Ernest added, "than to see the British sugar industry working together amicably as a whole. We have tried to find some basis of agreement, but those concerned in the beet industry have been unable or unwilling to see our point of view."

Their four refineries only 58½ per cent. of this country's requirements during the year under review. This figure, however, does not include two smaller refineries in which the company is interested, and which together supply 5 per cent. of the country's requirements. There is nothing we should like better," Sir Ernest

Tate and Lyle, Ltd., are spending a considerable amount of money on the reorganisation of their Love Lane refinery in Liverpool. The company has also come to a satisfactory arrangement with the Mersey Docks and Harbour Board, who have given them improved facilities for handling raw sugar, which will tend to economy in working costs.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

British West Indies.—A firm of agents in Port of Spain, Trinidad, wishes to obtain the representation of United Kingdom manufacturers of drugs and druggists' sundries, on a commission basis, for the British West Indies (except Jamaica). (Ref. 770.)

Canada.—A newly-established firm of manufacturers' agents at Vancouver is prepared to represent United Kingdom manufacturers of copper sulphate and powdered barytes, on a commission, consignment or purchase basis, for the Provinces of Alberta and British Columbia. (Ref. No. 772.)

Canada.—A firm of importers and manufacturers' agents, interested in the sale of druggists' sundries, desires to obtain additional United Kingdom agencies. They do business on commission, consignment or purchase basis, according to mutual agreement, and cover the whole Dominion. (Ref. No. 773.)

Canada.—The Officer-in-Charge of H.M. Trade Commissioners' Office at Winnipeg reports that a local firm is desirous of receiving quotations from United Kingdom sources of supply for iron filings. (Ref. G.X. 12094.)

South Africa and the Rhodesias.—An experienced engineer with considerable knowledge of South African and Rhodesian requirements is establishing an agency in Johannesburg, and desires to secure the representation of a United Kingdom manufacturer of electric arc and resistance welding plant. He is at present in this country. (Ref. No. 783.)

Germany.—The Commercial Secretary to H.M. Embassy at Berlin reports that a local firm desires to receive quotations for 6,200 square metres of copper bronze sheets for delivery to a building firm in Istanbul (Turkey). (Ref. G.X. 12088.)

Germany.—A commission agent of British nationality established at Cologne wishes to obtain the representation of United Kingdom manufacturers of pharmaceuticals and wax on a commission basis. Correspondence may be in English. (Ref. No. 794.)

Portugal.—A well-established firm at Lisbon wishes to obtain the representation of a United Kingdom firm exporting jute bags and Calcutta twills. (Ref. No. 797.)

Paraguay.—A commission agent in Asuncion desires to represent a United Kingdom firm manufacturing jute bagging. (Ref. No. 803.)

From Week to Week

THE BLAENAVON COMPANY, LTD., is to restart its by-product coke ovens and blast furnaces. About 400 men are to be employed.

THE LIBRARY OF THE CHEMICAL SOCIETY will be closed for the Christmas holidays from 1 p.m. on December 23 until 10 a.m. on December 29.

THE POLISH ALCOHOL MONOPOLY recently sold 1,100,000 gals. of alcohol to the Netherlands. This is the first lot of Polish alcohol placed on the Netherlands market.

APPLICATIONS HAVE BEEN RECEIVED at St. John's, Newfoundland, for prospecting privileges for over 1,500 square miles in Labrador, where a new discovery of gold was reported recently. The first aeroplane carrying prospectors to stake out their claims is said to be leaving in January.

NOTWITHSTANDING THE CONTINUOUS AGITATION in the press and elsewhere in Hungary against the numerous governmental and semi-governmental commercial enterprises, the municipality of Budapest has decided to erect a benzol factory in connection with and under the management of the Budapest Municipal Gasworks.

STOKE-ON-TRENT CITY COUNCIL, at a meeting held in private on November 31, decided not to approve terms which had been suggested by promoters who proposed to make a public issue of £800,009 capital for the erection of a papermaking factory in the city, which would cost £500,000 and would eventually employ 1,500 people.

HOPES ARE ENTERTAINED of finding a big market for Spanish cement in South America. If these hopes were fulfilled the cement works would increase production, and as they consume a great deal of small coal a good market for it would be assured. It is thought that the abolition of the customs duty on tar for the production of patent fuel will ultimately save the cement works enough money to enable them to compete successfully with foreign manufacturers.

THE INDIAN CHEMICAL SOCIETY is publishing a Jubilee volume, containing contributions from many eminent scientists in India and abroad, in commemoration of the seventieth birthday of Sir P. C. Ray, the foundation president of the Society. The price of the volume, which contains 350 pages is Rs.3 (4s. 6d.) for fellows and Rs.5 (7s. 6d.) for non-fellows. The orders for the volume should be sent to the hon. secretary, Indian Chemical Society, P.O. Box 10857, Calcutta.

CORROSION OF COIL CONDENSERS used in oil refining has been successfully combated by means of ammonia, according to the "Petroleum Times," and it is shown that the lives of these condensers are considerably lengthened by its use. Reduction in iron loss of from 75 per cent. to 95 per cent. by the experimental injection of ammonia into the vapour line immediately before the condenser was also noted. It is, of course, recognised that other alkalies, such as caustic soda and milk of lime, may be used as neutralisers whenever cheapness or convenience indicates.

A NEW METHOD for refining coconut oil, developed by Industries Dept. Bengal Government, involves percolation—as distinct from the filtration of the oil—through powdered and acid-washed animal charcoal. Experiments were also made with potasssium bicarbonate without success. Solution of sodium hydroxide and sodium chloride also failed to give desired results in removing colour or odour of the oil, although the acid number was decreased. Better results were obtained with sodium silicate, but the refined oil did not remain sweet for a sufficiently long time.

A PROCESS for the direct and rapid estimation of the free sulphur contained in liquid fuels and solvents is proposed by H. Kiemstedt. The liquid to be examined is shaken with mercury. The sulphur combines to form mercury sulphide, and is estimated by heating the mercury with concentrated hydrochloric acid, and catching the hydrogen sulphide in an ammoniacal solution of cadmium acetate, or in an iodine solution. It is stated that the test is not too reliable from the qualitative aspect, as blackening of the mercury may also be due to the action of peroxides, which frequently occur in cracked petroleum products and in certain solvents.

LECTURING AT THE MANCHESTER COLLEGE OF TECHNOLOGY, on November 30, to the North-Western branch of the Institution of Welding Engineers on "Cutting steel with oxygen machines," Mr. C. G. Bainbridge said that one of the first practical uses of the process after its introduction was, as the safe-makers had feared, for breaking open of safes. Nowadays firms producing large forgings had installed oxygen cutting machines, and found it convenient in many cases to eliminate expensive intricate forgings, which could not be conveniently or accurately done under the hammer, leaving the intricate shaping to be done by the oxygen cutting machine. A remarkable instance of this class of work was a forging of a complete ship's stern frame: the steel varied in thickness from twelve to fourteen inches. One of the greatest fields of development for the oxygen cutting process, in conjunction with oxy-acetylene or electric welding, was the fabrication of parts to substitute castings; a cutting machine was indispensable to firms undertaking this class of work.

THE ASSOCIATION of Sugar, Distillery and Agricultural Chemists of France will hold its third international congress at Paris from March 28 to April 5, 1934.

THE FIRST STAFF DANCE of the merged Welsh branch of Shell Mex and B.P., Ltd., was held at the Mayfair Cafe, Cardiff, last week. Mr. H. F. W. Flower, manager, and Mr. E. F. Fussell, assistant manager, were present.

SINCE 1928, the cultivation of digitalis has been extended to various parts of Kashmir, following experiments by the State Forest Department on a commercial scale. With continual progress, it is thought that the annual local demand for this product amounting to about five tons will be met entirely by domestic supplies.

EXPORTS OF COPPER SULPHATE FROM GREAT BRITAIN for the first nine months of 1932 totalled 42,960 tons, an increase of about 9,400 tons over the corresponding months of 1931. It is suggested that the recent weakness in Continental copper sulphate prices may restrain the foreign demand for the British product.

A LECTURE on "Oil-fired Furnaces" was given at Birmingham University on December 1, by Mr. T. F. Unwin (of Shell-Mex and B.P. Limited), at a gathering of the co-ordinating committee representing the Staffordshire Iron and Steel Institute, the Birmingham Metallurgical Society and the Birmingham local section of the Institute of Metals.

CABLES RECEIVED by the Zinc Corporation, Ltd., and North Broken Hill, Ltd., state that terms have now been settled with the labour unions at Broken Hill for a three years' agreement. These provide for a minimum wage of £4 4s. per week, to increase with any declared rise in the New South Wales basic wage over £3 16s. 6d. (now £3 10s.) and for a sliding scale bonus when the price of lead is £16 (sterling) and over. Before August 26 the New South Wales living wage was £4 2s. 6d., and the minimum wage at Broken Hill £4 10s. per week.

THE GERMAN GOVERNMENT has announced its willingness to buy 200,000 common white cabbage butterflies for experiments on dyes. Laboratory experiments on cabbage butterflies indicate that there is real colour in their wings, but so few of the insects have been caught that the experiments have produced no useful information. German research chemists are asking for a sufficient number of cabbage butterfly wings to yield half a pound of pure pigment, if the pigment is there to be analysed. With coloured butterflies the colour is not due to pigment.

AT A GENERAL MEETING of the Royal Institution held on December 5, Sir Robert Robertson, treasurer and vice-president, presiding, it was announced that the managers had elected Professor G. Elliot Smith as Fullerian Professor of Physiology, to succeed Professor J. B. S. Haldane, whose tenure of office expires next month. Mr. B. A. Fenwick, Mr. L. F. Gilbert, Mr. John Iball, M. T. J. Lonsdale, Mr. John MacArthur, Mr. R. W. Marriott, Mr. S. T. Medlicott, Mrs. F. Cardell Oliver, Miss Lucy W. Pickett, Dr. Erich Pohland, Mr. F. J. Selby, Dr. P. E. Spielmann and Mr. P. J. H. Unna were elected members.

THE DISCOVERY in Canada of a new and rich source of radium, and a mineral area producing gold and silver also, was described on November 24 by Major Bernard Day to the Institute of Mining and Metallurgy which met in the Institution of Mechanical Engineers. The site is near the Great Bear Lake in Northern Canada some 35 miles south of the Arctic Circle. So far some 40 tons of high grade hand-sorted, pitchblende silver ore has been shipped. The pitchblende content, from Government assays, should produce five grammes of radium. Five discoveries of gold have been reported ranging over a distance of 25 miles, and samples have assayed from 17s. 6d. to £20 per ton.

IN THE COURT OF APPEAL on December 5, Lords Justices Scrutton and Slesser heard an application by Lever Bros. and the directors of the company, of Port Sunlight, for an order for security of the costs of an appeal by Mr. G. H. Bagnall, of New Oxford Street, London, who was one of two defendants in an action in which Lever Bros. and their directors were awarded £20,000 damages for libel. Sir Patrick Hastings, K.C., on behalf of Lever Bros., explained that Mr. Bagnall's defence to the action was struck out after he had failed to comply with an order for disclosure of certain documents; and Mr. Justice Branson declined to allow him to take any part in the case. The real purpose of Lever Bros.' action, said counsel, was to obtain injunctions, which were granted, restraining the defendants from publishing further libellous statements about them. There was no intention to seek to obtain any damages at all against Mr. Bagnall, and he need take no further trouble by way of appeal on the matter of damages. Lever Bros. were asking for only £50 security. Mr. Bagnall stated that a few days ago he took £50 in Lever Bros.'s solicitors to show that he had money of his own. The Court ordered security to be given for £30.

Obituary

WILLIAM JOHN NICHOLSON, at 54 Caledonia Road, Saltcoats, late of Imperial Chemical Industries, Ltd., on November 27.

Forthcoming Events

Dec. 12.—Institute of the Plastics Industry (London Section). "The Finishing and Inspection of Moulded Goods." C. R. Baggett. 7.30 p.m. Windsor Castle Hotel, London, S.W.1.

Dec. 12.—Society of Chemical Industry (Yorkshire Section). Jubilee Memorial Lecture. "Alcohol through the Ages." Dr. E. F. Armstrong. 7.30 p.m. Chemistry Lecture Theatre, University, Leeds.

Dec. 12.—Institution of the Rubber Industry (London Section). "The Preparation of Rubber on Estates in Relation to the Requirements of the Rubber Manufacturer." Lt.-Col. B. J. Eaton. 7.30 p.m. First Avenue Hotel, London.

Dec. 13.—Institution of Petroleum Technologists. "The New de Laval S.N. Process of Dewaxing and Acid Refining of Mineral Oils." Nils Backlund. 5.30 p.m. Royal Society of Arts, John Street, Adelphi, London.

Dec. 13 and **14.**—Society of Glass Technology. Joint meeting of Illuminating Engineering Society. 6.30 p.m. on December 13, Caxton Hall, London. 149th ordinary general meeting 2.15 p.m. on December 14. Science Museum, London.

Dec. 14.—Institution of Chemical Engineers. "Testing of Chemical Plant." A. L. Bloomfield, Professor W. E. Gibbs, and Dr. A. J. V. Underwood. 5.30 p.m. Burlington House, London.

Dec. 14.—Society of Glass Technology (London Section). Annual Informal Dinner at the Ship Tavern, Ivy Lane, Newgate Street, London. 7 p.m.

Dec. 15.—Society of Chemical Industry (Birmingham and Midland Section). "Alcohol through the Ages." Dr. E. F. Armstrong. 7.30 p.m. University Buildings, Edmund Street, Birmingham.

Dec. 15.—Society of Chemical Industry. Joint meeting of Bristol Section and Plastics Group. Visit to the Avonmouth Works of J. Robinson & Co. 2.30 p.m. "The Use of Rubber in the Chemical Industry." Norman Swindin. 6.45 p.m. University, Bristol. Informal Dinner. 8.30 p.m. Hort's Restaurant, Broad Street, Bristol.

Dec. 15.—Chemical Society. Discussion on "The Chemistry of the Sterols, with special reference to Ergosterol," opened by Professor I. M. Heilbron. 8 p.m. Burlington House, Piccadilly, London.

Dec. 15.—Institute of Fuel. "Some Post-War Developments in High Pressure Boilers." C. S. Davey and H. Sparks. 6 p.m. Lecture Theatre of the Institution of Electrical Engineers, Savoy Place, London.

Dec. 16.—The Physical Society. 5 p.m. Imperial College of Science, South Kensington, London.

Dec. 16.—Society of Dyers and Colourists (Manchester Section). "Recent Investigations into the Behaviour of Direct Cotton Dyestuffs." S. M. Neale. Joint Meeting with the chemical Section of the Manchester Literary and Philosophical Society. 7 p.m. 36 George Street, Manchester.

Dec. 16.—Coke Oven Managers' Association (Northern Section). "The Work of the Scottish Coke Research Committee." William Davidson. 7.0 p.m. Armstrong College, Newcastle.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

BOAKE (A.) ROBERTS & CO., LTD., London, E., chemical manufacturers. (M., 10/12/32.) Registered November 22, series of £150,000 debentures inclusive of £100,000 already registered, present issue £66,500; general charge. *£46,800. June 27, 1932.

BRITISH RESIN PRODUCTS, LTD., London, E.C. (M., 10/12/32.) Registered November 24, £1,500 debenture to Commander J. Bird, Grosvenor House, Park Lane, W.; general charge.

Receivership

ATLAS ARTIFICIAL SILK PROCESSES, LTD. (R., 10/12/32.) F. Murgatroyd, C.A., of Duchy Chambers, Clarence Street, Manchester, and B. Walker, C.A., of 2 South Quay, Great Yarmouth, were appointed receivers and managers on November 30, under powers contained in trust deed dated March 3, 1932.

STANDARD SOAP CO., LTD. (R., 10/12/32.) H. A. McCann, C.A., of Revenue House, 7 and 8 Poultry, London, E.C.2, was appointed receiver and manager on November 30, under powers contained in mortgage debentures dated May 8, 1928, and October 14, 1929.

London Gazette, &c.

Company Winding Up

ATLAS ARTIFICIAL SILK PROCESSES, LTD. (C.W.U., 10/12/32.) Winding-up order, November 28.

Bankruptcy Information

JONES, SAMUEL, "The Cedars," Castle Bromwich, Warwick, tar distiller. (R.O., 10/12/32.) Receiving order, December 1, creditor's petition.

ADVERTISERS please note that the latest hour at which we can accept advertisements for insertion in these columns each week is 10 o'clock on Thursday morning.

SALES BY AUCTION

(1s. per line; minimum charge 3s.)

RE ACETATE PRODUCTS CORPORATION, LTD. (in Voluntary Liquidation).—By Order of the Liquidator, Sir W. Harry Peat, K.B.E., F.C.A., of Messrs. Peat, Marwick, Mitchell and Co.—Messrs.

FULLER, HORSEY, SONS AND CASSELL

have been instructed to realise this Company's Non-Inflammable Celluloid Works at Waddon, near Croydon, and they will accordingly offer same for SALE by AUCTION, on the PREMISES, on TUESDAY, JANUARY 10th, 1933, at eleven o'clock precisely, in the following manner.

As a First Lot will be Offered the

NEWLY ERECTED RAILSIDE FACTORY,

which has an Area of about 5¾ acres, with well-lighted brick-built Ground Floor Factory Buildings, having a Floor Space of about 42,000 sq. ft., and a Block of Two-storey Offices.

The Works have an independent water supply from artesian wells yielding 36,000 gallons per hour, and the Boiler House is fitted with two 25,000 lb. Babcock and Wilcox Boilers, 250 lb. w.p., which, together with the Lighting, Lifting, and other services, will be included in the purchase. Immediately after the sale of the factory will follow the SALE by AUCTION, in Lots in DETAIL, of the

NEW NON-INFLAMMABLE CELLULOID MAKING PLANT.

Comprising Four Becker Van Hüllen Hydraulic Pumps, with Werner-Pfleiderer Accumulators, Two Buhler and a Karlsruhe Hydraulic Filter Presses. Two Lindener 350 lb. Vacuum Kneaders, Four Lindener 350 lb. Vacuum Mixers, a Werner Pfleiderer 120 lb. Ditto, Six Sets Krupp Mixing Rolls, 1,200 by 600 m/m to 400 by 120 m/m; Three Becker Van Hüllen Single Hydraulic Celluloid Presses; Three Triple ditto, Two Circular ditto, Four Kleinewefers Slicing Machines, Three Karlsruhe 20 Daylight Hydraulic Polishing Presses, a Krause 65 in. Auto Guillotine, a Fomm Chopping Machine, a 7 ft. Rotary Washer, a Hydro Extractor, Three Disintegrators, Recovery and Distillation Plant, Four Ventilating Units, a Sulzer Calorifier, a Premier Water Cooler, 30 A.C. Motors 1 to 80 h.p., Pumps, Tanks, Laboratory Equipment, Weighing Machines, Shafting, Belting, Piping, Loose Tools, Office Furniture, and other effects.

IMPORTANT NOTICE TO CHEMICAL MANUFACTURERS.

The Factory will only be thus dealt with if not previously Sold as a whole, and, pending the Auction the Liquidator would be willing to consider Any Offer for the Factory, with All or Any of the Plant and Machinery.

Particulars of the Property and Catalogues of the Machinery may be had, when ready, of Messrs. PEAT, MARWICK, MITCHELL AND CO., Chartered Accountants, 11 Iremonger Lane, E.C.2; of Messrs. CLIFFORD-TURNER, HOPTON AND LAWRENCE, Solicitors, 81 Gresham Street, E.C.2; or of Messrs. FULLER, HORSEY, SONS AND CASSELL, Factory and Machinery Auctioneers, 11 Billiter Square, Fenchurch Street, E.C.3.

APPOINTMENTS VACANT

(1s. per line; minimum charge 3s. Sixpence extra is charged when replies are addressed to Box Numbers.)

WANTED, North London.—Junior Laboratory Assistant, for steel analysis. Experience essential. State full particulars and salary required. Box No. 1455, THE CHEMICAL AGE, Bouverie House, 154 Fleet Street, London, E.C.4.

APPOINTMENTS WANTED

(Prepaid—Twenty-seven words 1s. 6d.; every additional nine words 6d.) Replies can be received "Box , Office of this Journal," in which case our address is included in cost of advertisement, and charged as nine words.

BOYS of good character, well-trained and eager to work, will be gladly recommended by the Warden of the John Benn Hostel, Bower Street, E.1.

FOR SALE

(1s. per line; minimum charge 3s. Sixpence extra is charged when replies are addressed to Box Numbers.)

BROUGH'S Patent Indestructable Drums and Kegs, also Plain Welded, Double-seamed or Corrugated Drums and Kegs, of every description, from 1 to 80 gallon.—4 Upper Parliament Street, Liverpool. Telephone: Royal 2685. Telegrams: Superdrum, Liverpool.

CHARCOAL, ANIMAL and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill Jones Pop., London." Telephone: 3633 East.

CONTINENTAL Reliable House supplies big quantities of Ammonium Nitrate, and wants buyers and agents for England and Overseas. Box No. 1454, THE CHEMICAL AGE, Bouverie House, 154 Fleet Street, London, E.C.4.

DIAPHRAGM PUMPS, New, 3 in. Suction, £3 10s. delivered. The ideal pump for pumping sludge. THE CHALMERS-EDINA COMPANY, 36 Assembly Street, Leith.

'Phone 98 Staines.

FILTER PRESS 27 Chambers, 27 in. Diam.; 30 in. C. and N. Disintegrator; Copper Jacketed Pan, 3 ft. 6 in. dia., 2 ft. 6 in. deep; Werner Mixer, 3 gals.; 12 h.p. Marshall Loco Boiler, 120 lbs. w.p.
HARRY H. GARDAM AND CO., LIMITED., STAINES.

HYDRAULIC PRESSES AND PUMPS. Large stock in London. Price quoted for adapting and erecting.—THOMPSON AND SON, Maria Street, Millwall.

MIXERS by Werner and other makers, jacketed pans, disintegrators, grinders, good stock.—C. F. DAVIS, LTD., Hatcham Road, Old Kent Road, London, S.E.15.

TO DYERS and Artificial Silk Manufacturers.—Special Yarn Poles for Cotton, Wool and Silk Dyers, also Stove Poles, Dye Boxes, Bobbins, Rollers, Bogies, Yarn Barrows, etc. Special Lancewood Poles and Canes, superfine finish for Mercerisers. Prices on application.—CRAWFORD'S TURNING MILLS, Paisley, Scotland.